FORESTRY ABSTRACTS

VOLUME 15 1954 NUMBER 2

HISTORY OF THE INTERNATIONAL CLASSIFICATION OF FOREST LITERATURE

USERS of *Forestry Abstracts*, particularly those of long standing, are conditioned to the decimal classification of forestry literature. Most of them will have fresh in memory the fundamental change —from the Flury to the Oxford system—announced in the Editorial Notes to Vol. 13 (1), and the final modifications intimated in and adopted from Vol. 15 (1).

With the conclusion of this phase of change it seems appropriate to bring under short review the interesting history of the international classification of forest literature.

As early as 1903 the International Association of Forest Research Institutes—since 1929 called the International Union of Forest Research Organizations (IUFRO)—had put the question of forest bibliography on its agenda with the object of creating a universal system of classification and an international forest bibliography. The task was entrusted to a Bibliographical Committee which has been functioning as a permanent organ of the earlier Association and of IUFRO since 1903.

The most important name in the history of forest bibliography is that of Philipp Flury. This Swiss forester was a member of the Bibliographical Committee from its beginnings and it was he who did the greater part of the creative work.

It was not until 1933, after long and difficult preparation, that the Committee was able to present to IUFRO a complete system of classification of forest literature which was approved in Congress. In its printed form it bore the title 'Forest Bibliography' but came to be known widely as the *Flury System*. It was assigned the decimal signature 634.9F to distinguish it from the head 634.9 Forestry in the Universal Decimal Classification (UDC), which differs in the details of its subdivision. One of the Flury system's main uses was to classify the title references composing the International Forest Bibliography—a scheme organized by IUFRO for the regular exchange between member countries of references to forestry literature considered to be of international importance.

Chairmen of the Bibliographical Committee, who guided its proceedings up to the time when the Flury system of classification was completed, were Professors Bühler (Tübingen), Opperman (Copenhagen) and Troup (Oxford).

During the long period that elapsed before the Flury system could be completed and agreed upon, there had been great developments in forest research, particularly in the fields of wood technology and forest economics. New developments continued at an increasing rate after the system had been published and even in the 1930's the need for revision was under discussion by the Committee. These discussions were interrupted by the Second World War.

The first post-war meeting of the Bibliographical Committee was held in Zürich in 1948 under the chairmanship of Professor Burger. At this meeting the writer presented a completely revised system of classification of forest literature which had been prepared by this Bureau in consultation with the chief Research Station of the U.K. Forestry Commission (Alice Holt) and the Forest Products Research Laboratory of the Department of Scientific and Industrial Research (Princes Risborough). The revision was based upon 10 years' experience gained by the Bureau in the course of its day-to-day work in abstracting and classifying the world flow of forest literature.

No immediate action was taken by the Bibliographical Committee because IUFRO was at that time pre-occupied with negotiations regarding a working agreement with the Food and Agriculture Organization of the United Nations (FAO). When these were completed, however, the International Council of IUFRO proposed to FAO the appointment of a joint bibliographical committee to study the new classification and to make appropriate recommendations to its parent bodies. On this joint committee, IUFRO was to be represented by 3 members. FAO welcomed the initiative taken by IUFRO and appointed two representatives. This Joint FAO/IUFRO Committee on Forest Bibliography, which was to supersede the former Bibliographical Committee and take its special and permanent place as Section 01 of the newly formed Research Sections of IUFRO, held its first meeting in

Helsinki in 1949 and subsequent meetings—often of a protracted and arduous nature and with various specialists brought in for consultation—as follows:

30th Jan.–4th Feb. 1950	..	Oxford.
5th–8th June 1950 ..	..	The Hague.
30th Aug.–4th Sept. 1951	..	Wageningen.
8th–10th June 1953	..	Oxford.
18th–25th Sept. 1953 ..	..	Rome.

In addition, a sub-committee met members of the International Federation for Documentation (FID) at the Hague from 1st to 3rd June, 1950, and in the summer of 1953 a special consultation was arranged in Germany between two representatives of the Joint Committee—the writer and his Assistant Director—and a gathering of forestry experts of the German Federal Republic, at the invitation of Professor Mantel (Hann. Münden).

During all this time the proposed new classification system was carefully examined in all its details, and at various stages of revision was circulated as widely as possible to members of IUFRO and other research organizations throughout the forestry world, in order that the Committee might benefit by the experience and needs of as many experts as possible. All criticisms and proposals for amendment were carefully considered and a large number of them adopted. In the course of these revisions the parts concerned with forest economics in the broadest sense (heads 6, 7 and 9) underwent complete reorganization through proposals submitted by Professors Saari, Abetz, and Mantel. Heads 30, 35, and 36 were also completely revised on the basis of proposals submitted by the FAO Pilot Committee on Logging Techniques and collated by Professors Hilf (Reinbek-Hamburg) and Gläser (Hann. Münden).

As indicated above, the Committee was also in early contact with representatives of the FID regarding the possibility of incorporating the body of the new system into the Universal Decimal Classification. Negotiations with the Secretary General of the Federation have now reached a promising stage.

Throughout the four years of intensive revision and consultation, this Bureau acted as the natural clearing house for the mass of correspondence and collation involved.

The definitive English text of the new system of classification—called the *Oxford System of Decimal Classification for Forestry*—was, as briefly noted in our last number, finally presented to the Congress of IUFRO in Rome in September 1953, and unanimously adopted with the following recommendations:

1. In view of the high importance to forestry science of using a single up-to-date system of classification, the Congress urges all its members to adopt the Oxford System of Decimal Classification for Forestry to the level of subdivisions that they require and also to conform to such authorized applications and developments of the system as may from time to time be prescribed.

2. The original text of the Oxford System being English, it is desirable that authorized translations be published in at least French, German and Spanish.

Two months later the Conference of FAO, at its Seventh Session in Rome, signalized its approval of the System by adopting the following resolution:

THE CONFERENCE—

Notes with satisfaction the completion by the joint FAO/IUFRO Committee on Bibliography of a definitive English text of the Oxford System of Decimal Classification for Forestry, shortly to be published.

Notes, also, that translations into the official languages both of FAO and IUFRO are in hand.

Commends this system of classification for adoption by forestry libraries, institutes and documentation centres in member countries.

Requests the joint FAO/IUFRO Committee on Bibliography to review from time to time the classification as now established and to formulate recommendations for the application and development of the Oxford System, as may appear desirable; also to continue its negotiations to have the new system incorporated into the Universal Decimal Classification.

The new system has thus achieved world-wide recognition; it was early adopted by many Commonwealth centres and is being increasingly taken up elsewhere. Translations have already been made in Dutch, are well advanced for German, are in progress for French, Turkish and Finnish, and have been

initiated for Spanish (cf. IUFRO recommendation No. 2). Machinery has also been set up within the Joint Committee for guiding the application and development of the System on proper lines (*Request* of the FAO Conference).

The authorized English version has just been published by the Commonwealth Agricultural Bureaux on behalf of IUFRO and those not on the FAO official distribution list may order copies (10*s*. each; 12*s*. 6*d*. interleaved; post free) direct from Central Sales Branch, Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England.

The Joint Committee, at its own wish and consonant with its continuing responsibilities in the field of international forest bibliography, was strengthened by the addition of a sixth member at the Rome Congress of IUFRO, with the power to co-opt a seventh.

F. R.

EDITORIAL NOTE

Reviews.—Starting with this number, selected reviews (in English) of forestry literature will be noticed under the appropriate decimal head in the Abstracts.

Forestry Abstracts, Vol. 15, No. 2

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

TRANSLATIONS

See Nos. 1408, 1415, 1638, 1676, 1724, 1740, 1808, 1836, 1885, 2005, 2026.

0 (02). HANDBOOKS. MANUALS. TEXTBOOKS

1025. EDLIN, H. L. **The forester's handbook.** Thames and Hudson, London. 1953. pp. xii + 394 + 31 photos. Ca. 100 refs. Price 35*s*.

A general textbook of practical forestry designed for the use of estate foresters, land owners and land agents. It contains chapters on: Britain's woodland estate; tree growth and structure; seed collection and storage; nursery work; the planting site; preparation for planting; planning the new crop; choice of species; planting and weeding; natural regeneration and direct sowing; coppice, scrub, and devastated woods; tending and thinning; tree felling; measurement and valuation of timber and tree crops; marketing timber and forest produce; protecting woodlands against insects, fungi and harmful plants; fire and other causes of damage; shelterbelts and screens; trees in hedgerows, parks and gardens; management and plans of operations; financial assistance and taxation; tools and equipment; miscellaneous information on forestry societies, taxation, legislation, research etc.

0 (048.1). BIBLIOGRAPHICAL LISTS

See Nos. 1235, 1915, 1991.

0 (05). PERIODICALS. YEARBOOKS. DIRECTORIES. ALMANACS, CALENDARS, DIARIES

See also No. 2165.

1026. ***Forstwissenschaftliche Forschungen*: Beihefte zum *Forstwissenschaftliches Centralblatt*.** Verlag Paul Parey, Hamburg & Berlin. Irregular. Price according to scope (with a 20% reduction for subscribers to *Forstwiss. Cbl.*).

A new series, supplementary to *Forstwiss. Cbl.* and intended for original works too large to appear in that journal, or suitable in other ways for separate publication. Nos. 1 and 2, 1953, are noticed in this issue of *For. Abstr.* (Nos. 1267, 1350). Abbreviation in *For. Abstr.*: *Forstwiss. Forsch.*

1027. MÜLLER, R. Deutscher Forst- und Jagd-Kalender 1954. **[German forestry and game almanac, 1954.]** M. & H. Schaper, Hannover. [1953.] pp. 252 + forms and pp. for notes. [G.]

Mainly a compendium of sample forms and facts and figures useful to the forester, e.g. German official prescriptions on assortments, measurement and grading of wood; volume tables for felled timber; legislation on timber prices and sales; plant and seed tables; yield tables and increment % of chief species; woodcutters' equipment; materials (fungicides etc.) for forest protection; game regulations etc.; administrative organization of forestry; teaching and research institutions; all with reference to the W. German Federal Republic.

0 (084.3/4). MAPS AND ATLASES

See No. 1697.

0 - - 011. TERMINOLOGY. NOMENCLATURE

See also Nos. 1044, 1053, 1117, 1124, 1130–1, 1205, 1699, 1722.

1028. DANNECKER, K. Über forstliche Begriffe im Wandel forstlicher Anschauungen. **[The adaptation of forestry terms to changing forestry conceptions.]** *Schweiz. Z. Forstw.* 104 (10), 1953 (517–24). [G.f.]

Discusses certain terms used in German forestry [e.g. *Umtrieb*, *Hiebszug*, *Alter*, *Bestandeserziehung* and the terms used for various silvicultural systems] and shows their imprecision and inadequacy for modern conditions.

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

See also Nos. 1152–3, 2175.

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.2. Radiation and Temperature

1029. ROUSSEL, L. Recherches théoriques et pratiques sur la répartition en quantité et en qualité de la lumière dans le milieu forestier; influence sur la végétation. **[Theoretical and practical studies on the quantitative and qualitative distribution of light in the forest; its influence on vegetation.]** *Ann. Éc. Eaux For. Nancy* 13 (2), 1953 (293–400 + 6 plates). 209 refs. [F.g.e.]

This doctoral thesis, which has already been summarized by the author in the *Revue forestière française* [cf. *For. Abstr.* 14 (No. 2972)], embodies the author's researches on the effects of relative illumination in the forest. Part 1 (33 pp.) reviews earlier research with particular reference to methods of measurement (photochemical, photometers, photoelectric cells, actinometers). Part 2 (12 pp.) briefly discusses some general theoretical considerations on weather (e.g. the classification of degrees of clear and cloudy sky). Part 3 (40 pp.) describes the author's own experiments using (*a*) instantaneous photometric (the 'photopile'), (*b*) actinometric methods, to measure relative illumination, and ecological studies connected with them. [Cf. *For. Abstr.* 10 (No. 2415); 11 (No. 838).]

111.7. Humidity, Evaporation, Precipitation

See also Nos. 1054, 1063.

1030. GLOVER, J., and ROBINSON, P. **A simple method of calculating the reliability of rainfall.** *E. Afr. agric. J.* 19 (1), 1953 (11–3). 1 ref.

Shows how to derive from a run of rainfall data the probable % of seasons in which the rain will be less than a desired amount e.g. for the establishment or maturing of a crop. The difference between the average and the desired amount divided by the standard deviation gives the standardized difference, which is matched for % probability from a table.

111.8. Climatology. Climate and Microclimate

See also Nos. 1029, 1209, 1257, 1260, 1328–30, 1375–6.

1031. VARUGHESE, P. A. **Some recent works on arid zones.** *Trees, London* 17 (2), 1953 (70–2). 57 refs.

A list of 57 titles, under broad heads.

1032. AUBRÉVILLE, A.; KING, H. C. **A note on climate, forest-distribution, and aridity in Africa, summarised from Mr. A. Aubréville's 'Climats, Forêts et Désertification' 1949.** *Emp. For. Rev.* 32 (3), 1953 (226–32).

Cf. *For. Abstr.* 11 (No. 134).

1033. DELANY, M. J. **Studies on the microclimate of *Calluna* heathland.** *J. Anim. Ecol.* 22 (2), 1953 (227–39). 9 refs.

During daylight, ground surface temperatures were generally lower and more even within the vegetation than in the open, and humidity tended to be highest and least variable at the base of the vegetation.

114. *Soil. Soil Science.*

114.1. Soil Physics

See also Nos. 1054 *et seq.*, 1170, 1270.

1034. GREENE, G. E. **Soil temperatures in the South Carolina Piedmont.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 29, 1953. pp. 16. 9 refs.

Results of measurements (given in graphs and tables) in soils under (1) a 40- to 50-year-old Shortleaf Pine/hardwood stand, (2) an 11-year-old Loblolly Pine plantation, (3) a broomsedge field and (4) a barren eroded area, show that plant cover reduces the range of soil temperatures, the effect being greatest in summer with profile becoming progressively cooler from barren to high forest conditions.

114.2. Soil Chemistry

See also Nos. 1368, 1793.

1035. CECCONI, S. Ricerche sui colloidi minerali e organici di alcuni terreni forestali della Sila. **[Mineral and organic colloids of some forest soils of the Sila.]** *Ital. for. mont.* 8 (5), 1953 (228–32). 6 refs. [It.it.f.]

The clayey fractions of soils from under Chestnuts, Oaks, Larch and Beech were analysed by X-rays, and illite was found to be the predominant clayey mineral. The exchange capacity of the organic colloids in the upper horizons diminished in the order Oak, Chestnut, Beech, Larch.

1036. SIMONART, P., and HUYGH, A. Microbiologische bepalingen van koper in Kempische gronden. **[Microbiological determination of Cu in Campine soils.]** *Agricultura, Louvain (Ser. 2)* 1 (1), 1953 (52–75). 9 refs. [Flem.flem.f.e.g.] H.S.B.

Cu contents of soils under Oak (*Q. robur*, *Q. sessiliflora* and *Q. borealis*), Scots Pine, and heathland (*Calluna vulgaris*), and of cultivated soils, were determined microbiologically (from the development and colour in culture of the mycelium of *Aspergillus niger*) and of plant material (wood, twigs, bark, leaves or needles and litter of *Q. sessiliflora*, *Q. borealis* and Scots Pine) by calcination. Results are tabulated and show that: (1) Soils under Oak or mixed forest contain more Cu than those of the same soil type under Pine or heath. (2) The uptake of Cu by Pine is less than that by Oak (in the ratio 53 : 80). (3) The ratio of export of Cu (removal of Cu by clear felling) to the reserve of Cu in the soil is 1 : 10 for Pine and 1 : 25 for Oak. (4) There is a striking difference in Cu uptake of *Q. sessiliflora* and *Q. borealis*, which is in the ratio 10 : 7. This relative

unexactingness of the American Oak may account for its superior performance on heathland. (5) In lightly leached soils, Cu accumulates in the B horizon in a form available to the plant roots, while in podzols there is a similar accumulation in the B horizon but a large part of the Cu is probably in a non-available form. (6) The Cu content is increased by forest and heath fires. (7) The crude fertilizers used in forestry increase the Cu content of the soil. [Cf. *For. Abstr.* 15 (No. 1047).]

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 1044–5, 1048, 1153, 1212, 1341 *et seq.*

1037. DUCHAUFOUR, P. La dégradation de la structure des sols forestiers. [**The degradation of the structure of forest soils.**] *Rev. for. franç.* 5 (10), 1953 (657–65). 7 refs. [F.]

Discusses the ill effects of denudation on forest soils, leading to leaching and podzolization in permeable, sandy soils and the formation of a gley horizon in more compact soils, and stresses the importance of exposing forest soils to the sun for as short a time as possible.

1038. Vitesse de décomposition de la matière organique dans les conditions de la forêt. [**Rate of decomposition of organic matter in [tropical] forest.**] *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (144). [F.]

This project [cf. *For. Abstr.* 14 (No. 946)] was wound up. It was shown that litter of *Scorodophloeus zenkeri*, of *Panicum maximum* and of a mixture of forest species decomposed very rapidly, that of *Macrolobium dewevrei* rather slowly, and leaves of *Anonidium mannii* and *Musanga cecropioides* at a moderate rate.

1039. DUCHAUFOUR, P. Humus actif et humus inerte. Recherches expérimentales sur la minéralisation de l'humus forestier. [**Active humus and inert humus. Experimental studies on the mineralization of forest humus.**] *Ann. Éc. Eaux For. Nancy* 13 (2), 1953 (401–53). 53 refs. [F.f.g.e.]

Cf. *For. Abstr.* 13 (No. 1818); 14 (No. 2984).

1040. NĚMEC, A. Vliv buku na lesní půdu v oblastí kvadrových piskovců. [**Influence of Beech on forest soils on the [cretaceous] sandstone freestone formation.**] *Sborn. čsl. Akad. Zeměd.* 24 (1/2), 1951 (49–57). 3 refs. [Cz.cz.russ.e.] C.G.B.

Soil profiles have been studied in the Žehrov forest district, N.E. Bohemia (70-year-old pure Pine stand, density 0·6–0·7, with admixture of Birch, and several old Beech trees). The sandy soil, overlying sandstone freestone, shows podzolization, with a continuous hardpan. The degradation of the soil, which is very acid, is evident from the plant cover. The B horizon below the hardpan passes into the horizon of weathered sandstone. Under Beech, on the contrary, the soil profile seems to be of the normal type in brown forest soil, with slight podzolization. The acidity of both humus and mineral soil is lower than under Pines, and the soil richer in all mineral nutrients.

1041. TURUNEN, J. Harmaalepän lehdissä maahan menevistä typpimääristä. [**The amount of nitrogen reaching the ground in leaves of *Alnus incana*.**] *Metsät. Aikak.* 1953 (9), (293–5). 11 refs. [Fi.e.]

Measurements were made on dry weight of leaves at the beginning of leaf-fall and their N content, for some trees near Iisalmi in central Finland, and from these the amounts of dry leaf substance and of N reaching the ground annually per tree were calculated. N content of root nodules of some trees near Helsinki was also measured [cf. *For. Abstr.* 14 (No. 3166)]. Leaf N content was highest (2·24–2·60%) on moist sites, decreasing considerably (1·75–1·97%) on sites approaching dry soils or swamps. The dry weight and size of leaves was less clearly related to site moisture. About 22 g. N and 930 g. dry substance reached the ground annually in the leaves of an average tree about 23 years old, grown in full illumination. The total N content of root nodules at the beginning of leaf-fall averaged about 2·3% and was highest on the best sites. *From author's summary.*

1042. WINTER, A. G., and BUBLITZ, W. Über die keim- und entwicklungshemmende Wirkung der Buchenstreu. [**The inhibition of germination and seedling development by Beech litter.**] *Naturwissenschaften* 40 (15), 1953 (416). 5 refs. [G.] O.R.S.

Beech leaves collected (*a*) from the tree, (*b*) from the ground, in February were extracted with cold water, and the effect of the extracts on the germination of seeds, and on development after germination was studied, for Norway Spruce, Scots Pine, wheat, oats, poppy and cress. Extracts from (*a*) inhibited germination and growth; those from (*b*) appeared to stimulate root and shoot growth. Results are tabulated. [Cf. *For. Abstr.* 14 (No. 2981).]

1043. WINTER, A. G., and SCHÖNBECK, F. Untersuchungen über den Einfluss von Kaltwasserextrakten aus Getreidestroh und anderer Blattstreu auf Wurzelbildung und -wachstum. [**Research on the effect of cold-water extracts from straw and leaf litter on root formation and growth.**] *Naturwissenschaften* 40 (19), 1953 (513–4). 1 ref. [G.] O.R.S.

Includes an account of the effect of different concentrations (to 1 : 600) of water extracts of Apple leaves on rooting of Willow cuttings. Both the number of roots and their length were much greater in cuttings in the extracts than in controls, the effect being greatest with concentrations of 1:50 – 1:100.

114.4. Soil Classification. Soil Types

See also Nos. 1209, 1211–2, 1329, 1375.

1044. KUBIËNA, W. L. **The soils of Europe: illustrated diagnosis and systematics, with keys and descriptions for easy identification of the most important soil formations of Europe with consideration of the most frequent synonyms.** T. Murby & Co., London. 1953. pp. 318 + 26 coloured plates. Many refs. Price £3. 15*s.*

The main bulk of this work consists of a series of dichotomous keys, supported by (mostly coloured) drawings, for the identification of (*a*) humus forms;

(*b*) forest, grassland and arable soils of Central and N. Europe, using three separate approaches; (*c*) as (*b*) but for S. Europe; (*d*) alpine-type soils. It ends with a general key arranged after the author's 'natural system', embracing all the essential soil characteristics and their interrelations, hence ordering the soils according to their phase of development. Rules of nomenclature, claimed to be objective and generally applicable, are also propounded and a synonymology presented of the major soil designations from different countries.

The book is also issued in German and in Spanish.

1045. MANCINI, F. Su alcuni interessanti terreni forestali dei pressi di Altopascio (Lucca). **[Some interesting forest soils near Altopascio, Lucca.]** *Ital. for. mont.* 8 (4), 1953 (182–5). 6 refs. [It.it.f.]

Describes some profiles less than 1 m. in depth, on gravels and sands, the natural development of the profile being impeded by clayey deposits which cause small temporary water-tables to form.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See Nos. 1037, 1202, 1209, 1285, 1332, 1341 *et seq.*, 1652–4, 2175.

114.6. Soil Biology

See also Nos. 1286–7.

1046. BOQUEL, G., KAUFFMANN, J., and TOUSSAINT, P. Recherche de l'influence du climat et de la végétation sur la flore microbienne des sols tropicaux. **[Studies of the influence of climate and vegetation on the schizophyte flora of tropical soils.]** *Agron. trop.* 8 (5), 1953 (476–81). 5 refs. [F.]

Studies were made in the Ivory Coast on soil samples taken from (*a*) a plot of undisturbed forest, (*b*) a cleared plot which was kept free of vegetation, and (*c*) a cleared plot on which vegetation had been let to grow. The subjects studied were (1) N fixation (*Azotobacter* and *Clostridium* spp.), (2) aerobic decomposition of cellulose by Myxobacteriales (*Cytophaga* and *Cellvibrio* spp.), (3) nitrifying activity, (4) total N, (5) total organic Ca. The rainy season was found to favour the proliferation of *Clostridium*, of Myxobacteriales and probably of nitrifying bacteria. The absence of vegetation causes a definite regression of Myxobacteriales. The presence of vegetation has no influence on the C/N ratio which remains constant throughout the year.

1047. SIMONART, P., and HUYGH, A. Over de microbiologie in de Kempische bosgronden. **[Microbiology of forest soils in the Campine.]** *Agricultura, Louvain* (*Ser. 2*) 1 (1), 1953 (33–51). 8 refs. [Flem. flem.f.e.g.] H.S.B.

The microbial population of soils under Oak, Pine and heathland in spring, summer and autumn was studied by the plate method and by direct microscopic count. Physical and chemical characteristics of the soil samples were also determined. The bacterial population was always highest under Oak, that of mould fungi under Pine. The heathland soil was the most subject to seasonal fluctuations, having its highest content of micro-organisms in summer, and, as separate measurements showed, to fluctuations in soil temperature in heathland soil. The number of organisms decreased with increasing depth, except at 20–30 cm., where the number was smaller than in the 30–40 and 50–60 cm. layers. Respirometric tests showed relationships between the respiration coefficient and number of living micro-organisms, humus content and cation-exchange capacity of the soil. In Pine stands the number of micro-organisms increased with applications of $CaCO_3$, but was not affected by applications of P fertilizers. The presence of a small % of Oak among the Pine also increased the numbers of micro-organisms. [Cf. *For. Abstr.* 15 (No. 1036).]

1048. DAVEY, C. B., and MADER, D. L. **Density of micro-organisms in different types of forest humus as determined by the use of molecular membrane filter.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (73–4). A.P.B.

A variety of humus types were investigated in order to obtain a picture of the interrelationship between the morphology and nature of organic layers and the density of microbial populations. A definite correlation was revealed between the origin of the humus forms and the density of their colony-forming aerobic and anaerobic micro-organisms.

1049. JEFFERYS, E. G., and HEMMING, H. G. **Fungistasis in soils.** *Nature, Lond.* 172 (4384), 1953 (872–3). 3 refs. [Butterwick Research Laboratories, I.C.I., Welwyn, Herts.]

Further evidence, from independent experiments, which appears to support the discoveries of Dobbs and Hinson [see *For. Abstr.* 15 (No. 32).]

1050. AYTOUN, R. S. C. **The genus *Trichoderma*: its relationship with *Armillaria mellea* Vahl ex Fries) Quel. and *Polyporus schweinitzii* Fr., together with preliminary observations on its ecology in woodland soils.** *Trans. bot. Soc. Edinb.* 36 (2), 1951/52 (1953) (99–114 + 1 plate). 28 refs. O.B.D.

Ten isolates of *Trichoderma* were opposed to two strains of *Armillaria mellea* and one of *Polyporus schweinitzii* on parallel, hanging malt-agar smears at pH 3·4–5·1 and 7·0. All 10 isolates of *Trichoderma* were identical in their action towards *A. mellea*. At pH 3·4, where the two mycelia met on the medium, *Trichoderma* hyphae coiled round those of the host. Penetration was occasionally observed, but more often the hyphae of *Trichoderma* grew in close contact with those of the host which later showed signs of deterioration. Subsequent failure to sub-culture the *A. mellea* colony indicated that it had been killed. When the two mycelia met on the glass between the agar smears, parasitization took place only at the points of actual hyphal contact. On a medium of pH 5·1 parasitization was evident but seemed less severe than on the more acid medium. On a medium of pH 7·0 no signs of parasitization could be observed. The rhizomorphs of *A. mellea*, when invested by *Trichoderma* hyphae, stopped growing after a few days. When the hyphal

tips were later transferred to a fresh medium, however, they continued to grow. *P. schweinitzii* was parasitized by *Trichoderma* on a medium of pH 3·4. Hyphae of *Trichoderma* in contact with *P. schweinitzii* on the agar medium cause deterioration of the host hyphae. On one occasion only, crystals were seen to form in the medium in the area of parasitization. Chlamydospores of *P. schweinitzii* formed on the glass between the smears and were readily invested by the hyphae of *Trichoderma*, but no evidence of deterioration could be observed. On media of pH 5·1 and 7·0 no evidence of parasitization could be observed. Investigations of the quantitative ecology of *Trichoderma* in woodland soils showed it to be a typical member of an acid woodland-soil flora. The quantity present in these woodland soils does not appear to differ markedly from that found in similar soils outside the influence of the trees, and in both these areas *Penicillium* is more prevalent than *Trichoderma*. *From author's summary.*

1051. MURPHY, P. W. **Soil faunal investigations.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (123–6).

The quantitative structure and vertical distribution of the fauna in natural heathland and cultivated heathland planted with Sitka Spruce is outlined. The populations obtained from these habitats represent 570,000 and 835,000 organisms/sq. m. respectively. In the natural heathland this total is concentrated in the first 2½ in. of the profile, whereas in the cultivated site, in addition to the litter fauna, there is a considerable % in the raw-humus 'sandwich' created in the cultivation process. Acari preponderate markedly in both sites.

1052. RONDE, G. Vorkommen, Häufigkeit und Arten von Regenwürmern in verschiedenen Waldböden und unter verschiedenen Bestockungen. 3. Untersuchungen in der Inn-Chiemsee-Salzach-Moränenlandschaft. 4. Untersuchungen auf der Münchner Schotterebene. **[Occurrence, population densities and species of worms in different forest soils under different cover types. 3. Investigations in the Inn-Chiemsee-Salzach moraine district. 4. Investigations on the Munich pebble beds.]** *Forstwiss. Cbl.* 72 (9/10), 1953 (286–301). 4 refs. [G.]

[Cf. *For. Abstr.* 14 (No. 1896).] (3). Investigations were made on (*a*) moderately steep slopes, (*b*) old moraines, (*c*) humid soils and (*d*) afforested agricultural land; (*a*) and (*d*) were most favourable to worm populations; and (*c*) the most unfavourable. On (*c*) and (*b*) Spruce was unfavourable to worm populations. On all sites Fir, Beech, Larch, Oak, Sycamore (*Acer pseudoplatanus*) and Ash were favourable. On old moraines a change in species and volume of worm populations was noted with stand age, populations being high at the first closing of the canopy and in the mature stand, and decreasing thereafter as the stand becomes more open.

(4). Sites investigated were (*a*) low terrace, (*b*) high terrace and (*c*) old moraines. Most favourable were (*a*). Both pure Spruce and pure Beech reduce worm populations, but their mixture is less unfavourable.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 1031–2, 1326, 1328–9, 1369, 1371, 1375–6, 2171.

1053. **Soil and water conservation glossary prepared by the Soil Conservation Society of America.** *J. Soil Wat. Conserv.* 7 (1; 2; 3), 1952 (41–52; 93–104; 144–56).

1054. GÖHRE, K. Beitrag zur Verdunstung in Abhängigkeit vom Sättigungsdefizit der Luft. (Nach Messung an der Lysimeter-Anlage in Eberswalde). **[The correlation of evaporation with the saturation deficit of the air (from measurements at the Eberswalde lysimeter station).]** *Arch. Forstw.* 1 (3), 1952 (137–44). [G.g.]

As the result of 7 years' observations the author confirms the close correlation between evaporation, as measured by the Wild evaporimeter, and the saturation deficit of the air. This correlation is linear if sufficient water is present to supply the evaporation demand of the air. This case is shown for a sandy soil with grass cover and ground water at 1 m. Where the condition is not fulfilled, the correlation in the circumstances tested is expressed by equations having a negative quadratic term, the value of which grows in increasing proportion as the soil water deficit increases. Equations of this sort are given for the soil in question: bare; grassed; and planted with Pine; and for wet and dry days. The saturation deficit of the air and the water deficit of the soil are also linearly correlated.

1055. HUBER, B. Was wissen wir vom Wasserverbrauch des Waldes? **[What do we know about the water consumption of the forest?]** *Forstwiss. Cbl.* 72 (9/10), 1953 (257–64). Many refs. [G.]

Reviews with tables and graphs the present state of knowledge on the transpiration of forest stands, and the methods used in measuring transpiration, based largely on central European literature.

1056. HURSH, C. R., and PEREIRA, H. C. **Field moisture balance in the Shimba Hills, Kenya.** *E. Afr. agric. J.* 18 (4), 1953 (139–45). 3 refs.

Reports some results of a survey of catchment conditions made in the Shimba Hills in June and October 1952. It was found that an impervious clay layer usually underlies the sandy surface horizons. Data collected in adjacent forest and grassland showed that, while roots of forest trees frequently penetrate the clay, grass roots fail to do so and consequently much of the soil moisture under grass is lost by evaporation, whereas percolation is good in forest soils. The superiority of forest cover over grass from the point of view of catchment management in this region is stressed. Trees and shrubs should, however, be cleared from the margins of streams, where they may cause considerable loss of water yield.

1057. RICH, L. R. **Consumptive use of water by forest and range vegetation.** *Proceedings of the American Society of Civil Engineers, New York* 77 (90), 1951. pp. 14. 9 refs. Price $0·50. P.O.

Field data and graphs from Arizona are presented to show the feasibility of determining the water consumption of vegetation under natural conditions

by analysing water disposal separately for the periods of (1) soil moisture recharge, (2) water surplus, (3) soil moisture utilization and (4) water deficit. Water use in the semi-desert grassland and chaparral was 81–92% of the precipitation for perennial grasses, 84% for shrubs, and 78–89% as evaporation from bare soil; on forested catchments 77–90%, depending on depth of soil and slope.

1058. VEIHMEYER, F. J. **Use of water by native vegetation versus grasses and forbs on watersheds.** *Trans. Amer. geophys. Union* 34 (2), 1953 (201–12). 7 refs. H.S.B.

Soil-moisture records from plots on potential range lands in California on which native vegetation, mostly woody brush species, was left intact, and from adjacent plots that were denuded by burning, were obtained for several years. Following the fire, grasses and forbs usually succeeded the brush, and here the soil had a higher moisture content at the end of the growing season than in the unburnt plots, and the conclusion was reached that, in most cases, appreciable savings of water could be effected by burning brush in order to supplant it with grasses or forbs of forage value. [Cf. *For. Abstr.* 10 (Nos. 1588, 2429).] *From author's summary.*

1059. CROFT, A. R., and MONNINGER, L. V. **Evapotranspiration and other water losses on some Aspen forest types in relation to water available for stream flow.** *Trans. Amer. geophys. Union* 34 (4), 1953 (563–74). 7 refs. H.S.B.

Measurements were made on plots under (1) deep-rooted Aspen [*Populus tremuloides*] and (2) herbaceous ground cover, at a high elevation in Utah, to discover water loss through evapotranspiration. Measurements before and after removal of the Aspen showed that the net water claim of (1) was ca. 8 in., and that of (2) ca. 4 in. Erosion from sites deliberately bared was extremely heavy.

1060. KITTREDGE, J. **Influences of forests on snow in the Ponderosa/Sugar Pine/Fir zone of the central Sierra Nevada.** *Hilgardia, Berkeley, Calif.* 22 (1), 1953 (1–96). 43 refs.

A detailed study (data given in more than 90 graphs and 30 tables) was made of density, depth, interception, rate of melting, evaporation etc. of snow in the forested zone of the western slopes of the Sierra Nevada. It is concluded that forest cover, by reducing the rate of snow melt, may reduce flood crests which result primarily from heavy rains. Yields of water from snow could be increased by silvicultural management designed to create many openings in the forest, of a width between once and twice the height of the trees, in which maximum amounts of snow would be trapped. This treatment would also prolong the flow of streams later into the summer. *From author's summary.*

1061. LASSEN, L., LULL, H. W., and FRANK, B. **Some plant-soil-water relations in watershed management.** *Circ. U.S. Dep. Agric.* No. 910, 1952. pp. 64. 42 refs.

A review, diagrammatically illustrated, of available technical knowledge on the relations of vegetation with infiltration, run-off, stream-flow etc., and its application to the management of catchment areas.

1062. ROTHACHER, J. S. **White Hollow watershed management: 15 years of progress in character of forest, run-off and streamflow.** *J. For.* 51 (10), 1953 (731–8).

Data from the White Hollow Catchment, part of the forest bought by the TVA, show that vegetal cover can be quickly increased, erosion controlled and peak flows from summer storms greatly reduced. The improved vegetation has less effect on peak flows in the wet winter and spring seasons. Total run-off has remained constant but the rate has been moderated with a consequent increase in potability. Histograms illustrate increases in number of trees, basal area, crown density, litter extent and depth, and timber volume and value. The reduction in peak discharge from various intensities of rain on both wet and dry soils is shown graphically. A table relating water infiltration to cover puts recently abandoned cultivation and burns as the most defective.

1063. WIND, R. Opvangen van zout uit de lucht door een dennenbosje in de duinen. [**The interception of salt from the air by a Pine wood on the dunes.**] *Repr.* from *Water, Den Haag* 1953 (4, 5). pp. 11. 9 refs. [Du.du.] (*Mededeling van de technische commissie voor Duinonderzoek van het I.T.B.O.N.* No. 3.)

In connexion with a study of the effect of dune vegetation on water quality [cf. *For. Abstr.* 14 (No. 39)] an attempt was made to discover the degree of interception of wind-borne salt particles by a 20-year plantation of *Pinus nigra* var. *calabrica* 1500 m. from the shore. This was done by measuring over 12 months the Cl content of water in rain gauges installed below ground level in 3 rows running from S.W. to N.E. and covering a strip of the plantation 20 m. broad; 2 gauges in each row were placed outside the plantations, one to the S.W. and the other to the N.E. in low-growing dune vegetation. The accumulation of Cl for the year in each rain gauge within the plantation averaged 398 mg. as against 247 and 240 mg. for the exterior gauges S.W. and N.E. of the plantation respectively. The average quantity of Cl in the 2 gauges of each row nearest to the S.W. (seaward) margin of the plantation was 7 times that in the exterior gauges on that side. Analyses of the retained water at points on a line running roughly at right angles to the shore showed that, other factors being equal, Cl content decreased with increasing distance from the shore. Correlations were found between monthly Cl content of the water in the gauges and both wind strength and rainfall.

1064. SHERRY, S. P. **The effect of different methods of brushwood disposal upon site conditions in Wattle plantations. I. Experimental layout and apparatus designed for the measurement of run-off and soil-loss.** *Rep. Wattle Res. Inst. S. Afr. 1952/53,* 1953 (33–41). 4 refs.

Uniform sites, each having a different angle of slope, were selected in a Wattle plantation, and 3 methods of brushwood disposal carried out in adjacent 0·1-acre plots on each site after clear felling.

These treatments consisted respectively of burning all the brush-piles, burning alternate brush-piles and allowing all brush-piles to rot down naturally. Within each plot, smaller plots of 0·01 acre were laid out for the measurement of run-off and soil loss. Exterior run-off was excluded by a sheet-metal barrier. These specially designed run-off collecting tanks at Bloemendal are described and illustrated in detail. [See following abstract for results.] *From author's summary.*

1065. **Long-term study of the effects of brushwood burning on the site and on the [Black Wattle] crop.** *Rep. Wattle Res. Inst. S. Afr. 1952/53*, 1953 (19).

[See previous abstract for lay-out of experiment.] At Bloemendal the 1952 rains began in August, the subsequent 14–15 weeks giving over 8 in. without run-off. On 9 Dec. a storm of 8·47 in. in ca. 30 min. caused soil losses in the following ratio:—

(1) Plots with no brushwood piles burned — 1
(2) „ „ half „ „ „ — 15
(3) „ „ all „ „ „ — 200

The greatest losses recorded were on the steepest slope with all brushwood burned (0·51 tons of leaf litter and 8·64 tons of soil per acre). In the rest of the year run-off occurred 17 times, in 9 of which soil loss was recorded. The soil lost on steeper slopes under treatment (3) averaged 45·32 tons per acre, or ca. $\frac{1}{3}$ in. of topsoil in 4 months.

1066. MURAI, N. **[The influence of topography and ground cover on slope soil erosion in the forests of [the volcanic ash region of] Tomakomai (Report 1).]** *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (229–42). 16 refs. [Jap.e.]

Preliminary results after one year's measurements are tabulated and show that surface erosion from bare S.W. aspects, steep slopes and cut-over areas facing N.E. is greater than that from bare N.E. aspects, gentle slopes and forest areas facing N.E. *From author's summary.*

1067. GLOVER, SIR H. M. **Soil conservation in parts of Africa and the Middle East. Part 1.** *Emp. For. Rev.* 32 (3; 4), 1953 (222–5; 351–4 + 5 photos).

Notes on a tour in South Africa and Tanganyika.

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 1559 *et seq.*, 1979 *et seq.*

1068. CALLAHAM, R. Z. **A technique for establishing attacks of isolated bark beetles.** U.S. Bureau of Entomology and Plant Quarantine, Washington. 1953. pp. 2.

For the purpose of studying the responses of different species of *Dendroctonus* as they attack the same tree, it is necessary to have a satisfactory method of inducing isolated beetles to attack the host. This leaflet describes such a method—the fixing to the bark of a tree of a cone of fine-mesh metal, the apex of which is closed after the beetles have been inserted. In a study of the behaviour of single ♂s, single ♀s and pairs of beetles made by this method, examination of the galleries made by paired beetles and single ♀s revealed normal attacks, egg galleries and broods. Single ♂s did not attack.

1069. PATEL, N. G., and PATEL, G. A. **Host plants, distribution and abundance of Thrips (Thysanoptera) of Bombay state.** *Journal of the Bombay Natural History Society, Bombay* 51 (3), 1953 (597–607). 19 refs. O.R.S.

1070. ROONWAL, M. L. **Further remarks on the distribution of the Lantana bug, *Teleonoma scrupulosa* Stål (Hemiptera, Tingidae) in India since its introduction in 1941 from Australia.** *Indian For.* 79 (11), 1953 (628–9). 1 ref.

Some insects escaped from the Forest Research Institute at Dehra Dun in 1941 and established themselves on *Lantana aculeata*, for the control of which they were being considered. Ten years later an exhaustive survey revealed that the insect had not spread further than 26 miles—a rate of about $2\frac{1}{2}$ miles/year.

1071. NUORTEVA, P. Experimentelle Untersuchungen über die Nährpflanzenwahl einer oligophagen Zikade, *Aphrophora alni* (L.) (Hom., Cercopidae). **[Investigations into the choice of food plant by an oligophagous frog-hopper, *A. alni*.]** *Annales Entomologici Fennici, Helsinki* 17 (1), 1951 (10–7). 3 refs. [G.g.] I.I.E.

In laboratory tests to discover the food habits of *A. alni* the following descending scale of preferences was established: *Betula verrucosa, Alnus incana, A. glutinosa, Salix caprea, S. phylicifolia, S. aurita, Populus tremula, Picea abies.* The choice follows the systematic classification of the species, but does not entirely agree with field observations, where the preferred species are *Betula* spp. (but only on moist sites), *S. phylicifolia* and *S. aurita.* It seems therefore that site factors also influence the choice of food in nature.

1072. GRÖNBLOM, T., and SUOMALAINEN, E. Über das Vorkommen der Nonne, *Lymantria monacha* L. (Lep., Lymantriidae), in Finnland. **[The occurrence of *L. monacha* in Finland.]** *Annales Entomologici Fennici, Helsinki* 16 (4), 1950 (178–81). 12 refs. [G.] I.I.E.

Lymantria monacha, although rare, is not unknown in Finland. A brief review is given of occurrences reported to date.

1073. LLOYD, R. W. ***Ostoma ferrugineum* L. (Col., Clavicornia, Ostomidae) new to Britain.** *Ent. mon. Mag.* 89 (1073), 1953 (251).

O. ferrugineum was discovered under bark of Scots Pine in Aberdeenshire in 1952.

1074. MALKIN, B. **African species of the genus *Machlotes*.** *Rev. Zool. Bot. afr.* 48 (1/2), 1953 (149–61). 6 refs. [E.]

The 11 African species (7 added here) are described. The biology of these colydiid bark beetles is obscure.

15. ANIMAL ECOLOGY (GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING)

See also Nos. 1027, 1233.

1075. KREFTING, L. W. **Effect of cutting Mountain Maple [*Acer spicatum*] on the production of deer browse.** *Minn. For. Note* No. 21, 1953. pp. 2.

1076. Bramble, W. C., and Goddard, M. K. **Seasonal browsing of woody plants by white-tailed deer in the ridge and valley section of central Pennsylvania.** *J. For.* 51 (11), 1953 (815–9). 8 refs.

Cf. *For. Abstr.* 14 (No. 52).

1077. **Effects of logging on fish habitat.** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1952*, 1953 (33).

The following tentative conclusions are drawn from a study by the Oregon Co-operative Wildlife Research Unit since 1951: (1) temperatures in small tributary streams are raised as a result of felling but rarely by more than 5° F.; (2) ash and charred material entering small streams during and after slash-burning increased pH from a normal of 7·0 to 7·6, which is well within the limits of trout tolerance and may even be favourable; (3) in small streams, when silting was serious as a result of logging and road-building, a marked reduction of trout food organisms was noted and in one small stream crossed by tractor logging, a reproducing cut-throat population was eliminated with almost all other aquatic life.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 1036, 1041, 1079, 1085, 1654, 1766 *et seq.*, 2086 *et seq.*

1078. Voigt, G. K. **The effect of different tissue pretreatments on the physico-chemical properties of expressed plant sap.** *Repr.* from *Plant Physiol.* 27 (4), 1952 (818–21). 12 refs.

The effects of different expression pressures, dicing, autoclaving, steaming and freezing on needles of *Pinus resinosa*.

161. *Physiology*

See also Nos. 1036, 1042–3, 1055 *et seq.*, 1161–3, 1172–4, 1206, 1294, 1321, 1381, 1657, 1734.

1079. Takada, H., and Nagai, S. **Notes on the rich chloride content and the osmotic pressure of *Metasequoia glyptostroboides*.** *Proceedings of the Japan Academy, Tokyo* 29 (6), 1953 (274–8). 18 refs. [E.e.] O.R.S.

Variations in water content, osmotic value, and Cl fraction of samples from 16 conifer species, studied on the cell sap expressed from needles, are tabulated. Species differences in total osmotic pressure and water content were slight but much the highest Cl fraction was found in *M. glyptostroboides*; its content remained at a fairly constant level throughout the day and could not be directly related with fluctuations in osmotic pressure.

1080. Petritschek, K. Über die Beziehungen zwischen Geschwindigkeit und Elektrolytgehalt des aufsteigenden Saftstromes. **[The relationship between rate of flow and electrolyte content of the rising sap.]** *Flora, Jena* 140 (3), 1953 (345–85). 66 refs. [G.g.] O.B.D.

Measurements of the electrical conductivity of sap of *Betula pendula* gave figures between 1 and $7{\cdot}40^{-4}$ ohm^{-1}. Rate of flow as measured through a hole of 1 cm. inner diam. varies from 0 to 110 c.c./hr. In the course of the day a slight drop in concentration was recorded at the time of swiftest flow. Higher up the tree, concentration rises a little and rate of flow is reduced. Electrical conductivity of the twigs themselves is less variable than that of solutions obtained by immersion of the twigs. In the field there is a marked increase in electrical conductivity at the end of the winter resting season, and when the sap rises. In *Clematis vitalba* when the rate of flow rises by 9 or 10 times its original rate, concentration sinks by one-third. In the same species before noon a greater concentration of salts is found than in the afternoon, at the same rate of flow.

1081. Parker, J. **Photosynthesis of *Picea excelsa* [*P. abies*] in winter.** *Ecology* 34 (3), 1953 (605–9). 6 refs. [University of Idaho, Moscow, I.]

Photosynthesis and respiration of *P. abies* were measured by a constant recording infra-red gas analyser in late autumn and early winter near Munich (Germany). On warm, sunny days photosynthesis was about 4 times greater than respiration at the daytime peak. Even on cold days, when the air temperature was below freezing most of the day, some photosynthate accumulation was indicated by the results. *From author's summary.*

1082. Audus, L. J. **Plant-growth substances.** Leonard Hill Ltd., London. 1953. pp. xix + 465 + 53 photos and dgms. 24 pp. of refs. Price £2. 2*s*. 0*d*.

A comprehensive review of the present state of knowledge. Includes a glossary, lists classifying the auxin responses of plant cuttings and the sensitivities of plants to phytohormone herbicides (both including tree spp.).

1083. Samantarai, B., and Kabi, T. **Secondary growth in petioles and the partial-shoot theory of the leaf.** *Nature, Lond.* 172 (4366), 1953 (37). 3 refs. [Ravenshaw College, Cuttack, India.]

Isolated leaves are able to live independently in soil with root systems of their own induced from their petioles by the application of synthetic growth regulators. Leaves of *Amarantus gangeticus* var. *tristis* were grown in soil with such induced root systems. After a month the petioles became thicker and stouter, and transverse sections (a photomicrograph of one is given) revealed the anomalous type of secondary growth peculiar to the stem of the species. Secondary growth was also seen in the petioles of rooted leaves of *Chenopodium album* and *Ipomoea batatas*, and the types were the same as seen in their respective stems. It is known that auxin controls cambial growth. In these cases it seems that the formation of accessory cambium and the activation of fascicular cambium were due to the synthetic growth regulator, which was also responsible for the root formation.

1084. Goor, C. P. van. **The influence of nitrogen on the growth of Japanese Larch (*Larix leptolepis*).** *Plant & Soil* 5 (1), 1953 (29–35). 9 refs.

Pot-culture tests were used to determine the influence of N and P on the growth of *L. leptolepis*. Average dry weight of shoots was used as a standard for determining growth, and leaf analyses were made to demonstrate the absorption ratio of the nutrients. The results indicate a N/P antagonism in Japanese Larch. N decreases the intake of P, and *vice versa*.

The growth reaction depends, however, on the N and P content of the soil. Growth is optimal over a narrow N/P ratio range, and decreases rapidly on both sides of this optimum. The poorer the soil in P, the more rapidly growth decreases as the supply of N is increased. In soil rich in P, absorption of this nutrient will be decreased by additional N but, because of the availability of excess P, the N/P ratio in the needles will not increase much above the optimum. In such cases added N may increase growth. P does not have a harmful effect on growth, except where only a little N is present. The ecological character of Larch as a pioneer species is discussed in relation to its low need for N and the N/P antagonism. [Cf. *For. Abstr.* 14 (No. 3351).]

1085. VIRTANEN, A. I., and MIETTINEN, J. K. **On the composition of the soluble nitrogen fraction in the pea plant and Alder.** *Biochimica et Biophysica Acta, Amsterdam* 12 (1/2), 1953 (181–7). 26 refs. [E.e.f.g.] [Biochemical Institute, Helsinki.] O.R.S.

Considerable differences were found between the two plants. Citrulline, the predominating free amino-acid in Alder, is absent from the pea, and the amides quantitatively dominant in the soluble N fraction of the pea are absent from Alder. Homoserine was found in the pea and not in Alder. [Cf. *For. Abstr.* 14 (No. 2014).]

163. *Embryology*

See also No. 1115.

1086. BAIRD, A. M. **The life history of *Callitris*.** *Phytomorphology* 3 (3), 1953 (258–84). 21 refs. O.B.D.

A study of cone development, the structure and development of the reproductive organs, and stages in the development of the embryo.

1087. BROWNLIE, G. **Embryogeny of the New Zealand species of the genus *Podocarpus*, section *Eupodocarpus*.** *Phytomorphology* 3 (3), 1953 (295–306). 19 refs. O.B.D.

1088. BOYLE, P., and DOYLE, J. **Development in *Podocarpus nivalis* in relation to other Podocarps. I. Gametophytes and fertilization.** *Sci. Proc. R. Dublin Soc.* (*n.s.*) 26 (12), 1953 (179–205). 31 refs. Price 6*s*. O.R.S.

Development of the gametophytes, the ♂ from pollination and the ♀ from the first appearance of the rudiment of the ovule, is followed in *P. nivalis* up to the completion of fertilization, thus giving a reasonably full account of these stages in a typical member of the *Eupodocarpus* section. Earlier records are confirmed, corrected, and extended. Comparison is made with these stages in *P. andinus* [cf. *For. Abstr.* 8 (No. 1642], representing the *Stachycarpus* group, and with other *Podocarpus* spp. where information is available. Preliminary tentative suggestions are made on the nature of the basal gametophytes and the gametophytic developmental tendencies in the family. *From authors' summary.*

164. *Morphology*

See also Nos. 1083, 1086, 1103–4, 1132 *et seq.*, 1157, 2101.

1089. RAO, T. A., GOVINDU, H. C., and THIRUMALACHAR, M. J. **Aerial roots in some tropical rain forest plants.** *J. Indian bot. Soc.* 29 (4), 1950 (224–6). 2 refs. O.B.D.

Describes the occurrence of aerial roots on *Trema orientalis* and *Vernonia monosis* and some shrubby species in Kemmangandi, Mysore.

1090. PIJL, L. VAN DER. **The shedding of leaves and branches of some tropical trees.** *Madj. Ilmu Al. unt. Indones.* 109 (1/3), 1953 (11–25). 9 refs. [E.] [University of Indonesia, Bandung.] E.M.B.

Discusses generally the systems of leaf- and branch-shedding in tropical plants, describing the structure of different types of leaf joint and discusses in detail the branch-shedding of *Albizzia procera*, *Phyllanthus acidus*, *Sonneratia acida*, *Persea gratissima*, *Salix tetrasperma*, *Casuarina* spp., *Xylopia curtisii*, *Agathis* spp., *Araucaria* spp., *Podocarpus* spp. and *Pinus* spp. [Cf. *For. Abstr.* 14 (No. 3044).]

1091. LAUBENFELS, D. J. DE. **The external morphology of coniferous leaves.** *Phytomorphology* 3 (1/2), 1953 (1–20). 16 refs. O.B.D.

1092. EAMES, A. J. **Neglected morphology of the Palm leaf.** *Phytomorphology* 3 (3), 1953 (172–89). 26 refs. O.B.D.

A largely neglected feature of gross Palm-leaf morphology is the presence in many pinnate genera of marginal strips of blade (here termed 'reins') which are not involved in the ontogenetic cutting-up of the blade into pinnae but are abscissed, together with the blade apex (the 'hook') when the leaf unfolds. Reins and hook are related to the evolutionary derivation of the compound from the simple Palm leaf. Within the family, the reins have undergone strong reduction along several lines, with only vestiges remaining in the palmate genera. The various reduction types of these structures are described. The pinnate leaf is the primitive type, the palmate advanced, with the costa-palmate transitional. Study of leaf ontogeny in 17 genera shows that the characteristic folds of the palm leaves arise fundamentally from the splitting of the leaf-blade when the primordium is about 1–2 mm. long and not from folding under compression. The palms stand apart from other angiosperms in method of leaf development, especially that of origin of the compound leaf. *Author's summary.*

1093. AVINÉE, E. Les Élaeocarpacées de Madagascar (Étude d'anatomie et d'histologie comparées de la feuille). [**The Elaeocarpaceae of Madagascar (comparative anatomy and histology of the leaf).**] *Ann. Sci. nat.* (*Bot.*) 13, 1952 (161–98). 8 refs. [F.] O.B.D.

1094. RAO, T. A. **Foliar sclereids in the Oleaceae. 2. Occurrence of terminal foliar sclereids in some species of the genus *Linociera* Swartz.** *J. Indian bot. Soc.* 29 (4), 1950 (220–4). 9 refs. O.B.D.

The distribution and types of sclereids found in the leaves of 6 spp. of *Linociera*.

1095. ERDTMAN, G. **On the difference between the pollen grains in *Alnus glutinosa* and those in *Alnus incana*.** *Svensk bot. Tidskr.* 47 (3), 1953 (449–50). O.B.D.

1096. CANRIGHT, J. E. **The comparative morphology and relationships of the Magnoliaceae. II. The**

significance of the pollen. *Phytomorphology* 3 (3), 1953 (355–65). 43 refs. O.B.D.

1097. Rao, V. S., and Sirdeshmukh, K. **An interesting abnormality showing phyllody and proliferation in flowers of *Cassia siamea*.** *Curr. Sci.* 22 (10), 1953 (312–3). A.P.B.

1098. Baum, H. Der Bau des Karpellstiels von *Grevillea thelemanniana* und seine Bedeutung für die Beurteilung der epeltaten Karpelle. [**The structure of the carpel stipe in *G. thelemanniana* and its significance in the study of epeltate carpels.**] *Phytomorphology* 2 (4), 1952 (191–7). 9 refs. [G.g.e.] O.B.D.

1099. Roelofsen, P. A., and Houwink, A. L. **Architecture and growth of the primary cell wall in some plant hairs and in the *Phycomyces* sporangiophore.** *Acta bot. neerland.* 2 (2), 1953 (218–25 + 8 photos). 10 refs. O.B.D.

A similarity is demonstrated between *Ceiba pentandra* var. *caribaea* and *Asclepias cornuti* and *Phycomyces*.

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 1132, 1135, 1144, 1157, 2089, 2175.

1100. Rol, R. La sélection en foresterie. [**Selection in forestry.**] *Bull. Soc. for. Belg.* 60 (10), 1953 (425–47 + 8 photos). [F.]

A lecture on the general principles of selection in tree breeding, with some notes on research being done in France.

1101. **Methods of isolation.** *Tree Genetics News Letter, Ekebo, Källstorp, Sweden* 2 (2), 1953 (3–4). [E.]

Describes a tent of parachute silk and a plastic tube, used at Ekebo to isolate respectively mother trees or ♀ flowers in artificial crossing experiments.

1102. Watanabe, M. [**The effect of heat on pollen viability of Japanese Black Pine and Japanese Red Pine.**] *J. Jap. For. Soc.* 35 (8), 1953 (248–51). 2 refs. [Jap.e.]

In an attempt to find a convenient method of sterilizing contaminating pollen of *Pinus thunbergii* and *P. densiflora* in pollinating equipment, it was found that: (1) Exposure to 50° C. for 4 hr. completely killed pollen of *P. densiflora*; (2) pollen of *P. thunbergii* gave 12% germination after exposure to 60° for 24 hr. but was killed by exposure to 70° for 1 hr. [Cf. *For. Abstr.* 14 (No. 83).] *From author's summary.*

1103. Zinnai, I. [**The morphological characters and the fertility of pollen of a colchicine-induced tetraploid of *Pinus densiflora*.**] *J. Jap. For. Soc.* 35 (8), 1953 (245–8). 6 refs. [Jap.jap.e.]

Pollen grains of this tetraploid were larger than those of diploid plants, and 37·3% contained 3–5 air sacs. Pollen with 4–5 air-sacs had 1 or 2 nuclei and a perfect or imperfect partition wall in the middle of the pollen grain. The pollen with 3 air sacs (35·3%) appeared to be normal. It is suggested that the number of air sacs is related to increment of the cytoplasm. The pollen fertility of the tetraploid was lower than that of the diploids. Irregularities in chromosome behaviour, frequently observed at first or second meiotic anaphase and telophase, are thought to be among the causes of reduced fertility. [Photographs, drawings, and tables have English legends.] *From author's summary.*

1104. Ehrenberg, C. E. **Studies on Elm pollen.** *Bot. Notiser* 1953 (3), (308–16). 16 refs. [E.e.] O.B.D.

Pollen samples from pressed sprays of *Ulmus glabra* were analysed for pollen fertility and pollen diameter variation. Partial sterility occurred in 47·2% of the samples. The range of variation was abnormally great in the material studied, owing partly to the occurrence of 'micro' and 'giant' pollen grains in samples with otherwise normal pollen, and partly to 2 trees that had an unusual distribution of the diameters and a high degree of sterility, and may have been auto-triploids. The variation of the mean size of grains from different Elms is considerable. From measurements of pollen diameter alone it is impossible to decide whether a particular tree has normal haploid pollen, or whether, through a synapsis for instance, it has formed a large % of diploid gametes. To judge from the occurrence of 'giant' grains in some of the samples, unreduced pollen grains are probably formed spontaneously in the Elm. The possible occurrence of a synapsis in some of the Elms is discussed. *From author's summary.*

1105. **The oxyquinoline method—a useful method for chromosome studies in conifers.** *Tree Genetics News Letter, Ekebo, Källstorp, Sweden* 2 (2), 1953 (4). [E.]

Describes the method and variations in its use for Pine, Spruce and Larch. It has given good results with all 3 species. [Cf. *For. Abstr.* 14 (No. 3056).]

1106. Gothe, H. Ein Kreuzungsversuch mit *Larix europea* D.C., Herkunft Schlitz, und *Larix leptolepis* Gord. 2. Mitteilung. [**Trials in crossing *L. decidua* (Schlitz provenance) and *L. leptolepis*. Second report.**] *Z. Forstgenet.* 2 (6), 1953 (122–5). 9 refs. [G.g.e.]

[Cf. *For. Abstr.* 14 (No. 88).] A report on the second year's growth. Failure after frost damage was 100% in selfed *L. leptolepis*, 55% in *L. leptolepis* × *L. leptolepis*, 12% in *L. leptolepis* × *L. decidua*, 2% in *L. decidua* × *L. leptolepis* and 3·5% in *L. decidua* × *L. decidua*. The superior height growth of the 1st-year hybrids was maintained, although the *L. decidua* caught up a little. The longer period of growth in *L. decidua* × *L. decidua*, and *L. decidua* × *L. leptolepis* was striking. No significant relationship could be established between climatic and physiological periodicity. There appear to be inherent differences in physiological periodicity between the crosses *L. decidua* × *L. decidua* and *L. decidua* × *L. leptolepis* on the one hand, and *L. leptolepis* × *L. leptolepis* and *L. leptolepis* × *L. decidua* on the other.

1107. **Genetics.** *Rep. Wattle Res. Inst. S. Afr. 1952/53*, 1953 (21–6). 3 refs.

[Cf. *For. Abstr.* 13 (No. 2778); 14 (No. 3057).] Gives data on the vigour and other characters of open-pollinated, selfed, hybridized and back-crossed progeny among *Acacia decurrens*, *A. mollissima* (Black Wattle) *A. dealbata* and *A. baileyana*. Colchicine treatment has produced tetraploids in Black Wattle and triploids or near-triploids occur. Progeny tests with this species show highly significant variations in basal-area growth. *A. baileyana* appears to be the most frost-hardy of 5 species observed and fairly vigorous F_1 seedlings, with Black Wattle as the other parent, have been produced. Pollen-dispersal data (distance and amount) for Black Wattle are included.

1108. Susmel, L. Saggio sul polimorfismo della picea nel Cadore orientale. **[The polymorphism of Spruce [*Picea abies*] in the eastern Cadore.]** *Ital. for. mont.* 8 (4), 1953 (171–81 + 4 plates). 3 refs. [It.f.]

Two distinct types of Spruce are to be distinguished in the Upper Cadore, differentiated by (*a*) open- and (*b*) close-grown crowns respectively. Type (*a*) is the more exacting, growing on the moister, more fertile soils and forming dense stands, while type (*b*) grows in more open formation on dry, stony sites. Differences in cone and branch form, bark colour etc. are described.

1109. Carlisle, A. **A study of the natural Pine-woods of Scotland: morphological and silvicultural variations of the native Scots Pine in Scotland.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (121–3).

1110. Laing, E. V. **Morphological variations in coniferous species.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (120–1).

The identification of hybrid Larch in the very young seedling stage has been found to be possible from an examination of the structure of the cotyledons of the newly germinated seedlings. The variation in cone structure in Japanese is almost as great as in European Larch.

The botanical differences between Shore Pine (*Pinus contorta*) and Lodgepole Pine (*P. contorta* var. *latifolia* or *P. murrayana*) have been studied in detail and are considered to be sufficient to define them as separate species. Differences exist in respect of seed size and colour and surface texture, number and length of cotyledons, serrations and apices of primary leaves, leaf anatomy and bark. Differences in wood anatomy are now being investigated.

1111. Robak, H. Finns det skyggetålende raser av europeisk lerk? **[Are there shade-tolerant races of European Larch?]** *Tidsskr. Skogbr.* 61 (7/8), 1953 (297–300). [Nor.]

Describes the French forest of Bramans, in Haute Maurienne, Savoy, where there is abundant regeneration of Larch in a mixed Larch/Spruce area managed on the selection system, and concludes that a race unusually tolerant of shade has developed here.

1112. Olofson, Å. Om de svenska björkarternas morfologiska variation och skogliga värde. **[Morphological variations and forest value of Swedish Birch species.]** *Svensk PappTidn.* 56 (20;21), 1953 (785–98; 818–39). 40 refs. [Sw.e.] P.R.

An analysis was made on a total of 5367 trees from 53 sample areas distributed throughout Sweden, trees being classified by a number of stem, branch, bark and wood characteristics (illustrated by photographs). The main factors discussed are: height/diameter relationship; stem type; stem cross-section; branch type; bark type; and wood quality (ocular classification as firewood, timber or veneer). The following proportional distribution was found for *B. verrucosa* and *B. pubescens* respectively: S. Sweden 71 and 29%; Central Sweden 58 and 42%; Central Norrland 32·9 and 67·1%; and N. Norrland 52·5 and 47·5%. The following results were obtained and are shown in graphs: (1) Height growth in all regions appears to stop at about 35 cm. d.b.h. The curves for Central and S. Sweden are closely related, while that for N. Norrland rises rapidly till about 25 cm. and then levels out. (2) The stem form of the two species combined improves from S. to N. of the country. The % of the worst types is very high for *B. verrucosa* in S. Sweden while that of good and fairly good types for *B. pubescens* is comparatively high throughout the country. (3) The % of round as opposed to irregular stem cross-sections increases towards the N. (4) The proportion of trees with very thick branches and acute branch angles decreases from S. to N. *B. verrucosa* in S. Sweden shows a higher % of trees with very thick branches (42%) than *B. pubescens* (17%). (5) Trees with barks coarsely and finely reticulately fissured are commonest in S. Sweden, those with vertically fissured barks in Central Sweden and Central Norrland, and those with paper barks in N. Norrland. (6) Wood quality (ratio of timber and veneer to firewood) for the 2 species combined improves from S. to N. *B. pubescens* gives better quality assortments S. and *B. verrucosa* N. of a line through Central Sweden.

1113. Balozet, L. Note sur une variété de *Melia azedarach* originaire d'Argentine. **[A variety of *M. azedarach* from Argentina.]** *Rev. int. Bot. appl. Agric. trop.* 33 (371/372), 1953 (461–3). [F.] [Institut Pasteur d'Algérie.] P.R.

Describes characteristics of plants from seed from Argentina, collected in a plantation where trees grew more rapidly, had larger flowers and fruits and lost their leaves 3 months later than normally. These last characteristics were not found in Algeria but there was greater vigour and other characteristics differing from the normal.

1114. Schwanitz, F. Über somatische Rückmutationen bei einer schmalblättrigen Pflanze von *Ilex aquifolium* L. **[A case of somatic back-mutation in a narrow- [and spineless-] leaved plant of *Ilex aquifolium*.]** *Z. Forstgenet.* 2 (6), 1953 (117–8). [G.]

1115. Griffith, A. L. **Hybridisation in the Cypresses [*Cupressus lusitanica*] in East Africa.** *Emp. For. Rev.* 32 (4), 1953 (363). [East African Agriculture and Forestry Research Organisation.]

Cypresses of the *C. lusitanica* sub-group are hybridizing in East Africa. In order to find out more about this, single-tree progeny trials were carried out with seed from 36 of the best *C. lusitanica* trees at Elburgon, Kenya. Seed was graded by size,

and sown on 1 April, 1951. By 23 April, when germination was general, it was noticed that seed of the same size from the same tree was producing different numbers (2–8) of cotyledons. Plants with 2, 3, and 4 cotyledons were labelled and were planted out in the arboretum in April, 1952. At this period there was no appreciable difference in colour or vigour of the plants and they averaged ca. 11 in. in height but those originating from 4 cotyledons (*a*) were respectively 11% and 10% poorer in height growth than those from (*b*) 3 cotyledons and (*c*) 2 cotyledons, while there was no significant difference between (*b*) and (*c*). A year later, height averaged just over 36 in., but (*a*) and (*b*) were now respectively 11% and 9% taller than (*c*). Again there was no apparent difference in colour, vigour or form among the 3 types. Thus (*a*), which in 1952 were 11% inferior in height to (*c*) were in 1953 11% superior. This is believed to be the first record of such a difference in the number of cotyledons of seedlings resulting from the seed of one tree.

1116. LITTLE, E. L., JR. **A natural hybrid Spruce in Alaska.** *J. For.* 51 (10), 1953 (745–7). 16 refs.

Publishes in Latin and English the description of × *Picea lutzii*, a new natural hybrid between *P. glauca* and *P. sitchensis* from the Kenai Peninsula, Chugach National Forest, based on herbarium material. The hybrid, which arose naturally from plantations, has been artificially produced in Denmark (1926), where Fabricius and Larsen have recorded and illustrated it. Very fast growth is reported from Sweden. [Cf. *For. Abstr.* 7 (Nos. 1605–6).]

168. *Histology*

See Nos. 1083, 1093, 1381, 1727 *et seq.*, 1768–71.

17. SYSTEMATIC BOTANY

1117. LANJOUW, J. [Editor]. **International code of botanical nomenclature adopted by the seventh International Botanical Congress, Stockholm, July 1950.** Chronica Botanica Co., Waltham, Mass. 1952. pp. 228. [E.F.] O.B.D.

Cf. *For. Abstr.* 12 (No. 1008).

1118. BRENAN, J. P. M. **International co-operation in African botany.** *Nature, Lond.* 172 (4387), 1953 (987–9).

Summarizes papers read at the 2nd plenary meeting of the Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale held at Oxford 29 Sept.–3 Oct. 1953. The papers are to be published in full.

172.8. Eumycetes (True Fungi)

See also Nos. 1488 *et seq.*, 1961 *et seq.*

1119. RAMSBOTTOM, J. **Mushrooms and toadstools: a study of the activities of fungi.** *New Naturalist*, Collins, London. 1953. pp. xiv + 306 + 24 monochrome and 46 coloured plates. 8 pp. of refs. Price 30*s.*

1120. INGOLD, C. T. **Dispersal in fungi.** Clarendon Press, Oxford. 1953. pp. viii + 197. 143 refs. Price 18*s.*

1121. WERESUB, L. K. **Studies of Canadian Thelephoraceae. X. Some species of *Peniophora* section Tubuliferae.** *Canad. J. Bot.* 31 (6), 1953 (760–78). 9 refs. O.R.S.

Describes 8 species and gives a key to their identification.

1122. VLOTEN, H. VAN, and GREMMEN, J. **Studies on the Discomycete genera *Crumenula* de Not. and *Cenangium* Fr.** *Acta bot. neerland.* 2 (2), 1953 (226–41 + 2 plates). 22 refs. O.B.D.

A morphological and taxonomic study of these important parasites of conifers, presenting characteristic differences whereby the 2 species may be distinguished. *Crumenula abietina* and *C. laricina* are transferred to the genus *Scleroderris*.

1123. JACQUES-FÉLIX, M. Momification de phanérogames par un champignon. **['Mummification' of phanerogams by a fungus.]** *Rev. Mycol., Paris* 17, *Suppl. colon.* No. 1, 1952 (1–9 + 4 photos). [F.] I.M.I.

Rhizomorpha corynecarpos was isolated from twigs and leaf skeletons covered with a white, sometimes powdery, substance with simple or branched protuberances; annular and reticulate vessels and ray cells of the twigs were invaded by the hyphae. The fungus was grown in culture on various nutritive media and produced a similar effect on sterilized twigs of *Juniperus virginiana*, *Crataegus oxyacantha*, *Corylus americana*, and *Fraxinus excelsior* and other species introduced into it. The growth of the fungus in a state of nature and in culture is described.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

1124. **Index Kewensis—Supplementum XI (1941-1950).** Clarendon Press, Oxford. 1953. pp. 273. Price £6. 0*s.* 0*d.*

1125. OLMSTEAD, R. L. **Use of bow and arrow in collecting small limb samples.** *J. For.* 51 (10), 1953 (750).

A 45-lb. bow, a long, heavy, metal arrow, and a spinning-reel attachment are used to get a light nylon line over a high limb crotch. This pulls up a ⅜-in. manila line, the end of which is brought to earth and attached just below the head of a short-handled pole pruner, the other end being attached to the lower part of the handle. A second line is used to lengthen the regular pull rope of the pruner, which is then hoisted to cut off the sample required. Two men are needed, but an alternative procedure for a single operator is described.

1126. TURRILL, W. B., and MILNE-REDHEAD, E. **Flora of tropical East Africa: Hypericaceae.** Crown Agents for the Colonies, London. 1953. pp. 23. Price 1*s.* 8*d.*

1127. TURRILL, W. B., and MILNE-REDHEAD, E. **Flora of tropical East Africa: Pedaliaceae.** Crown Agents for the Colonies, London. 1953. pp. 23. Price 1*s.* 10*d.*

1128. DALE, I. R. **A descriptive list of the introduced trees of Uganda.** Government Printer, Entebbe, and Crown Agents for the Colonies, London. 1953. pp. iv + 76. Price 10*s.*

1129. WYATT-SMITH, J. **Additions to the flora of the Malaya Peninsula.** *Malay. Forester* 16 (4), 1953 (221–3).

Notes on the occurrence of *Durio carinatus, D. graveolens, Chikrassia tabularis, Ceriops roxburghiana* and *Lophopetalum multinervium.*

1130. HILDEBRAND, F. H. Boomnamenlijst van 'Kapoeas-Barito' (Zuid-Borneo). **[List of tree species collected in 'Kapuas-Barito' (S. Borneo).]** *Rapp. Bosbouwproefsta., Bogor* No. 62, 1953. pp. 79. [Jav.Du.E.]

The list is in two parts arranged (1) by native names, and (2) under family, genus and species. Each gives the native name, its language or dialect, the scientific name, and durability class of the wood.

1131. HILDEBRAND, F. H. Boomnamenlijst van 'Bandjarmasin — Hoeloe-soengai' (Zuid-oost-Borneo). **[List of tree species from Bandjarmasin—Hulu-sungai (S.E. Borneo).]** *Rapp. Bosbouwproefsta., Bogor* No. 63, 1953. pp. 64. [Jav.Du.E.]

The list is in two parts arranged (1) by native names and (2) under family, genus and species. Each part gives the local name, its language or dialect, scientific name, and durability class of the wood.

174.2. Gymnosperms

See also Nos. 1091, 1108–10, 1116, 1728, 1737, 1784.

1132. GAUSSEN, H. La surévolution chez les Araucariacées. **['*Surévolution*' in the Araucariaceae.]** *Phytomorphology* 3 (3), 1953 (253–7). 13 refs. [F.] O.B.D.

Presents a list showing different stages of evolution of some organs in the Araucariaceae, and illustrating an apparent atavism in the phylogeny of this family.

1133. EAMES, A. J. **Relationships of the Ephedrales.** *Phytomorphology* 2 (1), 1952 (79–100). 65 refs. O.B.D.

Supports, on the basis of morphological and anatomical evidence, the splitting of the old order Gnetales into 3 orders—Ephedrales, Welwitschiales and Gnetales.

176.1. Dicotyledons

See also Nos. 1093–6, 1112–4, 1157, 1729–32.

1134. LITTLE, E. L., JR. **Five varietal transfers of United States trees.** *Phytologia* 4 (5), 1953 (305–10). A.P.B.

Quercus mississippiensis Ashe is reduced to a variety of *Q. stellata*, and *Ulmus floridana* Chapm. to a variety of *U. americana*. A new combination is presented, *Cercocarpus betuloides* var. *blancheae* = *C.* (*betuloides* var.) *alnifolius*. The 5 subspecies of *Prunus serotina* are treated as varieties, 2 of which are new combinations.

1135. CHARD, J. S. R. **Highland Birch.** *Scot. For.* 7 (4), 1953 (125–8).

Describes an élite type of Birch found in the Central Highlands of Scotland, apparently intermediate between *Betula pubescens* and *B. verrucosa*. Though existing stands are ill-grown and malformed, this appears to be due to browsing by sheep and deer, and historical evidence is adduced to support the view that this variety is worth encouraging.

1136. SWAMY, B. G. L. **The morphology and relationships of the Chloranthaceae.** *J. Arnold Arbor.* 34 (4), 1953 (375–411). 27 refs.

1137. RAIZADA, M. B., and CHATTERJI, R. N. **A new Burmese *Dillenia* [*D. parkinsonii* sp. nov.].** *Indian For.* 79 (10), 1953 (524–5 + plate).

1138. LEAL, C. G. Contribuição ao estudo da família Euphorbiaceae. **[Contribution to the study of the Euphorbiaceae.]** *Arquivos do Jardim Botânico do Rio de Janeiro, Rio de Janeiro* 11, 1951 (61–9 + 9 plates). 20 refs. [Port.] P.R.

Describes some new species of *Polyandra, Pera* and *Amanoa.*

1139. OCSKAY, S., and DUMITRIU-TĂTĂRANU, I. Contribuţiuni la studiul fagului din R.P.R. **[Contributions to the study of Beeches in Rumania.]** *Analele Academiei Republicii Populare Române, Bucureşti* (*Seria: Geologie, Geografie, Biologie, Ştiinţe Tehnice şi Agricole*) 3 (4), 1950. pp. 18 + 3 plates. 13 refs. [Rum.russ.f.]

The authors recognize in Rumania two species (*Fagus sylvatica* and *F. orientalis*) and a hybrid between the two similar to that described by Poplawska in the Crimea under the name *F. taurica* Popl.

1140. STEENIS, C. G. G. J. VAN. **Results of the Archbold Expeditions. Papuan *Nothofagus*.** *J. Arnold Arbor.* 34 (4), 1953 (301–74 + 1 photo). 67 refs.

The discovery in New Guinea of extensive forests in which fagaceous elements, particularly *Nothofagus* spp., are dominant, was one of the most remarkable finds of the Third Archbold New Guinea Expedition. These Papuan species of *Nothofagus* are very probably living fossils. Information is given on distribution, history, ecology and morphology of *Nothofagus*, and a subdivision of the genus is presented, taking into account material from New Guinea, and introducing some new subsections. The report concludes with keys to and descriptions of the 16 Papuan species recognized by the author.

1141. LI, H.-L. **Taxonomic notes on the Fagaceae of Formosa.** *Bull. Torrey bot. Cl.* 80 (4), 1953 (317–24). O.B.D.

Deals with *Castanopsis* spp., *Lithocarpus amygdalifolius, Pasania* spp., *Quercus semicarpifolia* subsp. *glabra* and *Cyclobalanopsis* spp.

1142. KENG, H. **A taxonomic revision of *Sassafras* (Lauraceae).** *Quart. J. Taiwan Mus.* 6 (1), 1953 (78–86). [E.jap.]

S. officinale, S. tzumu and *S. randaiense.*

1143. BLAKE, S. T. **Botanical contributions of the Northern Australia regional survey. I. Studies on Northern Australian species of *Eucalyptus*.** *Aust. J. Bot.* 1 (2), 1953 (185–352 + 36 plates). O.B.D.

A partial revision of the genus *Eucalyptus* as represented in the northern part of Australia. Accounts of 50 species are given, with discussions on taxonomy, distribution and nomenclature. All 42 species from the northern part of the Northern Territory are included, and 3 keys for their identification presented, based on (1) characters observable in the field, (2) hand specimens with buds and

flowers, and (3) hand specimens with fruits only. New criteria for the discrimination of species have been used: these include the number of lateral veins in the leaf, the leaf length/breadth ratio, and (to some extent) the exact distance of the intramarginal vein from the margin; and the shape of the free part of the calyx-tube of the flower. The juvenile stages, flowers, fruits and seeds are described for the first time for some species. Distribution maps are presented, and some changes in nomenclature introduced. *From author's summary.*

1144. PRYOR, L. D. **Anther shape in *Eucalyptus* genetics and systematics.** *Proc. Linn. Soc. N.S.W.* 78 (3/4), 1953 (43–8) + 2 photos. 9 refs. D.S.I.R.

As a result of a floral examination and progeny tests from a hybrid swarm of *Eucalyptus sideroxylon* and *E. albens*, it is deduced that anther group within the genus *Eucalyptus* does not correspond with interbreeding groups, although at some points they are in agreement. The inheritance of anther shape of hybrids between species in the Terminales and Porantheroidae is shown to be subject to the same kind of combinations as other morphological inheritance within the genus, such as juvenile leaf shape. A number of 'species' quoted by Blakely are very likely hybrids between parents belonging one to each of these two anther groups. *From author's summary.*

1145. GARDNER, C. A. **Trees of Western Australia. Nos. 18 and 19. *Eucalyptus oleosa* F. Muell. and its varieties, and Red Tingle (*Eucalyptus jacksonii* Maiden).** *Leafl. Dep. Agric. W. Aust.* No. 2064, 1953. pp. 10.

1146. GARDNER, C. A. **Trees of Western Australia: 20. The Red Box or Gum-barked Coolabah (*Eucalyptus intertexta* R. T. Baker). 21. Forrest's Mallee (*Eucalyptus forrestiana* Diels).** *Leafl. Dep. Agric. W. Aust.* No. 2082, 1953. pp. 7.

1147. WYATT-SMITH, J. **The Malayan species of *Sonneratia*.** *Malay. Forester* 16 (4), 1953 (213–6 + 3 photos + 1 tbl.). 2 refs.

Includes a tabular key for field characteristics of the 3 Malayan species: *S. caseolaris*, *S. ovata* and *S. alba*.

1148. CUATRECASAS, J. *Huertea*, un genre nouveau pour la flore de Colombie. [***Huertea*, a new genus for the Colombian flora.**] *Bull. Soc. bot. France* 100 (4/6), 1953 (159–63). [F.] O.B.D.

Two new species are reported: *H. granadina* from the sub-Andean forest of the western Cordillera, with its variety *H. granadina* var. *cumbrensis*, and *H. putumayensis* from the upper Putumayo river. A map showing the distribution of the genus *Huertea* is given.

1149. NARAYANASWAMI, V., and RAO, R. S. **A preliminary note on the Indo-Burmese species of *Grewia* Linn.** *J. Indian bot. Soc.* 29 (4), 1950 (177–90). 66 refs. O.B.D.

Notes on distribution and taxonomy.

1150. MOLDENKE, H. N. **Additional notes on the genus *Aegiphila*. XI.** *Phytologia* 4 (5), 1953 (347–54). A.P.B.

1151. STAFLEU, F. A. **A monograph of the Vochysiaceae. III. *Qualea*.** *Acta bot. neerland.* 2 (2), 1953 (144–217). 102 refs. O.B.D.

Short notes on morphology and distribution, with a key to and descriptions of the species.

18. PLANT ECOLOGY

See also No. 2175.

1152. RUBNER, K., and REINHOLD, F. Die pflanzengeographischen Grundlagen des Waldbaues. [**Site factors, plant geography and ecology as the foundations of silviculture.**] Neumann Verlag, Radebeul and Berlin, 4th ed. (rev.) 1953. pp. viii + 583. Many refs. [G.] Price *DM.*32 [£2. 18*s.* 0*d.*]

The arrangement of the subject-matter is essentially the same as in the 3rd ed. (1934), but all sections have been revised, and some re-written.

1153. ROWE, J. S. **Forest sites—a discussion.** *For. Chron.* 29 (3), 1953 (278–89). 10 refs.

Discusses the whole conception of 'site', with particular reference to biotic factors, and especially to the effects of fire in conditioning the development of plant communities. The influence of vegetation on itself and on the soil is discussed, with particular reference to the occurrence of frozen layers in the soil.

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 1140, 1655–6, 1710–1, 1713, 1717–8, 1720.

1154. RIGUAL, A., and ESTEVE, F. Algunas anotaciones sobre los últimos ejemplares de *Callitris quadrivalvis* Vent. en la Sierra de Cartagena. [**Notes on the last examples of *C. quadrivalvis* in the Sierra de Cartagena.**] *An. Inst. bot. A. J. Cavanilles* 11 (1), 1952 (1953), (437–77). 6 refs. [Span.] O.B.D.

The relict species *C. quadrivalvis* is fast disappearing from Spain, the only European country where it is still found. The remaining examples in the Sierra de Cartagena, their state of preservation and their dimensions are described. Data are also presented on the soil and climate of the region, and its ecology is discussed.

1155. JOLY, R. Les pins du sud-est des États-Unis (Southern Pines). [**The Pines ('Southern Pines') of the S.E. United States.**] *Rev. for. franç.* 5 (9), 1953 (585–604 + 3 photos). [F.]

Notes on the species, their silvicultural characters etc.

1156. TOMAŠEVIĆ, M. Nalazišta grozdastog ruja (*Rhus coriaria*) u NR Makedoniji i njihova dendrofloristička analiza. [**Habitats of *R. coriaria* in Macedonia and their dendrofloristic analysis.**] *Godišn. šum. nauč. opit. Inst., Skopje* No. 1, 1951 (195–201 + 3 tbls.). 4 refs. [Serb.g.]

R. coriaria grows in Macedonia up to 1100 m., mostly in the community *Quercus languginosa/Carpinus orientalis*, and also in *Quercetum cocciferae*.

1157. PRIEHÄUSSER, G. Der Formenkreis von *Betula verrucosa* und *Betula pubescens* Ehrh. im Bayrischen Wald. [**The natural populations of *Betula verrucosa* and *B. pubescens* in the**

Bavarian forest.] *Mitt. St. Forstverw. Bayerns* No. 27, 1952 (72–83). 5 refs. [G.]

The range, ecology, and morphology of the two species are described. *B. pubescens*, the more variable species, is the only choice for nurse and timber tree in moist forest where its drying of the ground aids the wind resistance of the stand. Seed selection is only successful if made from the best ecotypes and the seed sown in sites matching those of the seed trees. The seed and bract characters are given for two forms suitable for moist mineral soil, fen and peat conditions, and for two forms which, on account of the inclusion of hybrid swarms and of probable hybridization with *B. verrucosa*, should be rejected. The local *B. verrucosa* (very close to var. *saxatilis*) was never a forest stand tree and is unsuitable, because of its slow growth, for general inclusion in mixtures. Seed and bract characters are unreliable for the recognition of the more desirable but less frequent erect form. The pendulous form lodges snow and this and its whip effect damage young conifers. The need for good forms to replace high-quality imports is stressed.

1158. **Doka (*Isoberlinia doka*).** *Inform. Bull. For. Dep. Nigeria* No. 12, 1953 (1–2).

[Cf. *For. Abstr.* 3 (p. 199).] This tree, the commonest in the Guinea savanna, is remarkable for its coppicing powers. Leaf-shedding, flowering and fruiting proceed rapidly in January-February with some branch autonomy evidenced. Terminal inflorescences arise on every shoot, and flowering is protracted, pods becoming full-sized in May. Seed falls in July, and germinates on moist mineral soil with 10- to 12-in. root length developed at the first growth of the plumule. Shoot growth is 2 in. by the following January, with one pair of leaves, and up to 4 in. one year later. The shoot is at once replaced after burning. The development of a woody stem probably takes many years. Most trees of the Guinea savanna resemble Doka in phenology but *Anogeissus leiocarpus* remains leafless from January until after the first rains, an apparent adaptation to the inhospitable quartzite outcrops which it occupies.

181.1. Distribution, Natural Range

See also Nos. 1140, 1143, 1148–9, 1151, 1200, 1209.

1159. Li, H.-L. **Present distribution and habitats of the conifers and taxads.** *Evolution* 7 (3), 1953 (245–61). 16 refs. O.R.S.

The present distribution of the conifers and taxads (illustrated by maps) indicates a clear division into a northern and a southern group, existing according to palaeobotanical records since the late Palaeozoic. The widespread polytypic genera contain species of wide variation in both habitat and range. Nearly all the many monotypic and oligotypic genera, mostly of restricted or disjunct distribution, thrive best in a damp mesophytic habitat. These genera are now nearly all confined to lands bordering the Pacific, and it is assumed that these favourable habitats remained unchanged or little changed over long periods because of their location along the margins of two ancient land masses. The disjunct distribution of these relic genera and their more or less restricted and uniform habitats may be evidence in favour of Du Toit's modified theory of continental drift.

1160. Skallerup, H. R. **The distribution of *Diospyros virginiana* L.** *Ann. Mo. bot. Gdn.* 40 (3), 1953 (211–25 + 5 photos). Many refs. O.B.D.

Notes on factors limiting the range of Persimmon in the U.S.A. and on ways by which the tree is spread, with examples of 3 types of 'field invasion' of abandoned fields in the region of St. Louis.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 1184–6, 1257 *et seq.*

1161. Nienstaedt, H., and Olson, J. S. **Temperature and day-length factors affecting the growth of Eastern Hemlock.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (74–5). A.P.B.

Seed and bud dormancy of *Tsuga canadensis* are broken by moderate chilling. Short periods of darkness have to a lesser extent the same effect as chilling in breaking dormancy and increasing stem and leaf growth. Vigour increases with temperature up to at least 75° F., but is poor at 90°. Diurnal alternations of temperature are more favourable to growth than a constant temperature.

1162. Zlatarić, B. Efekti promjene fotoperiodizma kod bijelog duda, bagrema i [dvije] provenijencije crnog bora. **[Effects of varying the photoperiod on *Morus alba, Robinia pseudoacacia,* and *Pinus nigra* of [two] provenances.]** *Šum. List* 76 (7), 1952 (229–39). 9 refs. [Croat.croat.e.]

Presents results of tests in 1950 and 1951 in the nursery of the Department of Agriculture and Forestry, Zagreb University. Curtailment of day-length immediately after germination gave greater height growth in sun- than in shade-loving plants in the first season, but this trend was reversed in the second. The % differences between the maximum heights of the treated plants and the average height of the untreated ones were in 1950: (I) *Pinus nigra* (Dalmatian provenance) 31·3; (II) *P. nigra* (Continental provenance) 29·0; (III) *Robinia pseudoacacia* 30·4; and (IV) *Morus alba* 15·9%. In 1951, when the light conditions were not interfered with, the respective figures were: 15·3, 32·0, 27·0, and 94·5%, (IV) thus showing a better growth than the sun-loving (I), (II) and (III). Very short photoperiods (5–6 hours) reduced height growth. The following optimum conditions have been deduced from the tests; for (I), 9 days × 9 hours, for (II), 4 days × 7 hours; for (III), 9 days × 5 hours, and for (IV), 14 days × 7 hours.

1163. Wareing, P. F. **Growth studies in woody species. V. Photoperiodism in dormant buds of *Fagus sylvatica* L.** *Physiol. Plant., Copenhagen* 6 (4), 1953 (692–706). 23 refs. [E.e.]

[Cf. *For. Abstr.* 13 (No. 136).] It is shown that the stimulation of bud-break in Beech by light is a photoperiodic phenomenon. The buds of leafless seedlings of Beech readily break dormancy under long days, but remain dormant under day-length of 12 hours or less. With intact buds, the light-requirement is fully 'saturated' at an intensity of ca. 1000 lux, and there is no evidence for more than one

light-controlled reaction. Bud response appears to be governed by the length of the daily dark period, rather than by the length of photoperiod. The buds break dormancy with cycles which include short light periods, provided that the associated dark periods also are short. Interruption of a long dark period by a 'light-break' of one hour nullifies the effect of the dark period and results in bud-break. Bud-break occurs when favourable and unfavourable cycles are given alternately. When the bud-scales are removed by hand, leaving the meristematic tissue intact, growth of the leaves and internodes is promoted by exposure to continuous illumination, indicating a direct effect of light on that tissue. Determinations of the light-transmissive properties of the bud-scales indicate that ca. 0·7% of the incident light penetrates to the meristematic tissue. Hence with incident light of 1000 lux, the effective intensity within the bud is of the order of 7 lux. Stimulation of growth of 'de-scaled' buds occurs with light intensities as low as 20 lux. Beech buds appear to have no 'chilling' requirement, and the time of bud-break under natural conditions may in some regions be controlled by seasonal changes in daylength. It is postulated that the photo-reaction involved in these effects corresponds to the 'secondary light reaction' observed in the photoperiodic control of flowering in herbaceous species. This same reaction may be of general occurrence in normal leaf and internode development. *From author's summary.*

1164. Gajić, M. Neka zapažanja u vezi zavisnosti oblika klena (*Acer campestre* L.) od staništa na Majdanpečkoj Domeni. **[Observations relating to the dependence of the forms of *A. campestre* on site conditions in the Majdanpek Estate.]** *Šumarstvo* 6 (2), 1953 (140–2). 11 refs. [Croat.g.]

A. campestre subsp. *eu-campestre* var. *eirocarpum* is said to be associated with warmer sites, and *A. campestre* subsp. *eu-campestre* var. *leiocarpum* with colder ones.

1165. Tryon, E. H., and Pease, R. W. **Shading effects of natural canopies on Holly characteristics.** *Castanea* 18 (3), 1953 (70–83).

Detailed investigations on the effect of shade on the quantity and quality of *Ilex opaca* foliage showed that height, crown area and number of leaves are reduced by shade; so that, although the length, lustre and colour of the leaves are improved when the sunlight is reduced below 20%, it is on the whole better to grow Holly in the open.

1166. Warburg, E. F. **A changing flora as shown in the status of our trees and shrubs.** In *The Changing Flora of Britain*, Botanical Society of the British Isles, Department of Botany, The University, Oxford. 1953 (171–80). 20 refs. O.B.D.

Discusses (1) the introduction of alien species into Great Britain through forestry and through ornamental, fruit and other plantings, (2) the introduction and naturalization of *Acer pseudoplatanus*, *Cotoneaster microphylla*, *Rhododendron ponticum*, *Quercus cerris* and *Buddleia davidii*, and (3) the extension in range of certain species, such as *Sorbus aria* and *Pinus sylvestris*.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 1035–6, 1040–1, 1055–9, 1084–5, 1089, 1153, 1321.

1167. Tarrant, R. F. **Soil moisture and the distribution of Lodgepole and Ponderosa Pine (a review of the literature).** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 8, 1953. pp. 10. 12 refs.

Reviews the literature, and summarizes and discusses the characteristic requirements of the two species in relation to conditions in the Pacific Northwest.

1168. Fritts, H. C. **Radial growth of Beech, *Fagus grandifolia*, and soil moisture in a central Ohio forest during the growing season of 1952.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (83). A.P.B.

In a study of 24 Beeches in 3 forest communities, data from each were related to the soil moisture régime. In an Elm/Beech community one Beech exhibited a sudden and complete cessation of growth in early July. This was correlated with the disappearance of standing water and a rapid soil-moisture decrease at the 6-in. level in a depression near by. In a neighbouring Beech/Elm community there was ample soil moisture, and a Beech here exhibited maximum growth in early July, followed by a gradual reduction to a low rate in August, which continued into September. A tree in a Beech/Maple community, however, exhibited maximum growth in early June, followed by a gradual reduction to a low rate in July, which continued into September. This early decrease in growth rate was correlated with the reaching of wilting % in the deeper soil levels.

1169. Honda, N. **[Soil acidity and exchangeable calcium of soils under Chestnut orchards and Chestnut forests.]** *Scientific Reports of the Faculty of Agriculture, Okayama University, Okayama, Japan* No. 2, 1953 (19–27). 22 refs. [Jap.jap.e.]

Observations were made in 9 orchards and 17 forests. Fifty samples of soil from 12 sites where Chestnuts [*Castanea crenata*?] grew well and 14 where they grew badly, were examined for soil acidity and exchangeable Ca. On Ando soils there was no great difference in either factor between good and bad sites. On normal soils, soil acidity was generally lower and exchangeable Ca higher on the good sites. Chestnuts grew well even on soils with low exchangeable Ca, and previous research by the author has shown that they tolerate a fairly high Ca content, prefer moderately acid soils and dislike neutral soils. In fact, they cannot be called calcifuge in the narrow sense. *From author's summary.*

1170. Rennie, P. J. **Research into the physical and chemical properties of forest soils: porosity and aeration.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (108–9).

Continued observations over 4 seasons have been completed on the fluctuations of aeration and moisture content of natural *Calluna vulgaris* moorland, deeply ploughed moorland, and 20-year-old Sitka Spruce plantation on similar ground. So far

the following results have been obtained. (1) The *Calluna* peat overlying all geological types remains waterlogged for much of the year, aeration increasing only during prolonged dry periods. (2) Peat supporting *Eriophorum* and, to a lesser degree, *Erica tetralix*, is only slightly aerated during dry summer periods. (3) Medium-depth and deep single-furrow ploughing, whether carried out 3 or 11 years previously, provided highly aerated peat and soil horizons for tree rooting all the year round. (4) 'Reclaimed' moorland soils, which are known to support good tree growth, have a higher pore space and aeration at all horizons to 70 cm. depth, compared with natural moorland. (5) Four species tested upon a moorland soil vary in their capacity to reduce the high moisture status in the following decreasing order: Japanese Larch, *Pinus contorta*, Sitka Spruce and Birch.

1171. RENNIE, P. J. **Research into the physical and chemical properties of forest soils: rooting investigations.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (109–15).

Some of the data from this investigation are given in a series of graphs. Some noteworthy aspects are:—(1) The tendency of older *Calluna* (last burned 30 years ago) to form a secondary zone of rooting just above pan level, in addition to the outstandingly high 'root density' in the peat horizon. This tendency is not apparent in the younger *Calluna*, last burned 10 years ago. (2) The ability of Corsican Pine on a difficult site (ca. 10 cm. of loam over a hard laminated chalk) to exploit the subsoil and eventually deepen the easily rootable soil layer. (3) Differences in density and distribution of roots between various tree species; e.g. in one experiment Sitka Spruce and Birch appeared to be much less able to penetrate below 50 cm. than Japanese Larch or *Pinus contorta*. All species appear to develop a zone of maximum rooting correlated with the old heather peat buried by ploughing. (4) Basic slag applied to Sitka Spruce appeared to increase 'root density' twofold in the 0–30 cm. zone, and fivefold in the 40–50 cm. zone on a very stony subsoil.

1172. BERGEMANN, J. Grundlagen und Probleme der Mykorrhizaforschung in ihrer Bedeutung für die Forstwirtschaft. **[Fundamentals and problems of research on mycorrhiza, and its significance for forestry.]** *Mitt. Bundesanst. Forst- u. Holzw.* No. 33, 1953. pp. [iii] + 77 + 2 plates. 272 refs. [G.g.]

Reviews world research literature on this subject for German readers, emphasizing the lack of such research in Germany during the last 15–20 years, under the heads: types of mycorrhiza; endotrophic mycorrhizae; ectotrophic mycorrhizae (morphological, anatomical, physiological and ecological aspects); and significance of mycorrhiza in nurseries and plantations, reforestation work, steppe and moorland afforestation, and in connexion with fertilizing and soil cultivation in the forest.

1173. MELIN, E., and NILSSON, H. **Transport of labelled nitrogen from an ammonium source to Pine seedlings through mycorrhizal mycelium.** *Svensk bot. Tidskr.* 46 (3/4), 1952 (281–5). 6 refs. [E.] O.B.D.

The tests were made with Pine seedlings, growing in purified sand with added nutrient solution, and inoculated with mycelium of *Boletus variegatus*. The results showed clearly that there was a transference of the labelled N through the mycelia to the Pine roots.

1174. GREGORY, K. F., and ALLEN, O. N. **Physiological variations and host plant specificities of rhizobia isolated from [nodules of] *Caragana arborescens*.** *Canad. J. Bot.* 31 (6), 1953 (730–8 + 2 photos). 13 refs. O.R.S.

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See also Nos. 1153, 1186, 1476–7.

1175. LANE, R. D., and MCCOMB, A. L. **Effects of grass competition upon the establishment of hardwood plantations in Iowa.** *Res. Bull. Ia. agric. Exp. Sta.* No. 399, 1953 (433–59). 41 refs.

Third-year results are reported for a test of the effects of removing sod competition, mulching with sod, and root pruning, on the survival of *Robinia pseudoacacia*, *Fraxinus pennsylvanica* var. *lanceolata* and *Ulmus americana*, planted in both medium and heavy sod covers. (1) Root pruning, mulching with inverted sod, and scalping, alone or in combination, had no clear effect on 3rd-year survival of field-planted hardwood seedlings. This failure to obtain response is attributed to moisture conditions very favourable for growth during the first growing season, and to the masking effect of damage caused by insects, rodents, and freezing. (2) Root pruning resulted in a more fibrous root system but had no important effect on growth. (3) Sod removal by scalping resulted in highly significant increase in growth. (4) The addition of an inverted-sod mulch to the scalps gave highly significant growth responses. There was a significant interaction between mulching and scalping and the data suggest that mulching became more beneficial as the scalp size increased.

Results of these studies, and of others reviewed, strongly indicate that the influence of grasses on soil moisture can be of critical importance in establishing hardwood plantations in sod where soil moisture reaches the wilting % during the growing season. Scalping and mulching offer means of conserving soil moisture, and resulted in increased growth in these experiments. The minimum effective circular scalp size used in these experiments was 24 in. diam. The addition of inverted-sod mulch to the 24-in. scalp produced about as much growth as scalping to 48-in. diameter. The 48-in. scalp with sod mulch gave the greatest growth response. *From authors' summary.*

181.5. Reproductive Behaviour

See also Nos. 1248 *et seq.*

1176. LEIBUNDGUT, H., and MARCET, E. Pollenspektrum und Baumartenmischung: Beobachtungen über den Pollenniederschlag auf dem Uetliberg bei Zürich im Jahre 1950. **[Pollen spectrum and the mixture of species: observations on pollen-shed on the**

Uetliberg near Zürich in 1950.] *Schweiz. Z. Forstw.* 104 (11/12), 1953 (594–611). [G.f.]

Daily samples of pollen deposit were taken throughout the flowering season in a natural mixed stand at about 830 m. In all, 20,531 pollen grains from 15 species were collected. It was shown that the duration and intensity of flowering of the different species were closely correlated with precipitation and temperature [cf. *For. Abstr.* 14 (No. 3173)]. Pollen desposition reflects very poorly the mixture of species in neighbouring forests, and its distribution depends largely on the diurnal direction of the prevailing wind and consequently on local conditions. The best expression of the relative frequency of pollens is obtained by comparing the ratio per cent frequency of pollen/per cent frequency of wind with distribution per cent of numbers of stems of the species.

1177. Larsen, C. M. Formation spontanée de fleurs sur de jeunes trembles. [**Spontaneous flowering of young Aspens.**] *Bull. Soc. for. Belg.* 60 (10), 1953 (448–58 + 4 photos). 3 refs. [F.] [Institut de Populiculture, Union Allumettière, Grammont.]

During the winter of 1951–2 a large number of seedling *Populus tremula* × *P. tremuloides* hybrids were planted out on several sites together with a smaller number of seedlings and cuttings of other Poplars of the section *Leuce*. The plants were 1–4 years old, mostly 3- and 4-year-old seedlings cut back in the previous spring, with vigorous stems and well developed root systems. In the summer of 1952 abundant formation of flower buds was observed on many of these plants, but none on plants left in the nursery. The proportion of plants flowering varied with the site, being largest (71·2%) on a very dry and lowest (1·3%) on a very wet soil. The spring of 1952 was unusually dry, and it is concluded that vigorous development and the possession of good reserves of nutrients by the cut-back plants combined to enable them to flower when the soil conditions were too poor to allow of vegetative growth.

1178. Francini, E. Osservazioni sulla sessualità di *Ceratonia siliqua* L. [**Observations on the sexuality of *C. siliqua*.**] *Nuovo G. bot. ital. (n.s.)* 58 (3/4), 1951 (1952) (423–40). 14 refs. [It.it.e.] A.P.B.

Cf. *For. Abstr.* 13 (No. 2834).

1179. Bauer, F. Die Fruchtentwicklung bei der Roteiche. [**Acorn development in *Quercus borealis*.**] *Forst u. Holz* 8 (22), 1953 (323–5). [G.]

Photographs illustrate various stages in acorn development and a list is given of times of acorn setting observed in different parts of Germany in 1949.

1180. Crossley, D. I. **Seed maturity in White Spruce.** *Silv. Res. Note For. Br. Can.* No. 104, 1953. pp. 16. 12 refs.

Cone colour did not prove a reliable index of maturity; firmness of the cone, colour of the testa and brittleness of the seed are more reliable.

1181. **Factors affecting reproduction of Spruce and Balsam.** *Rep. B.C. Dep. Lds. For. 1952*, 1953 (57).

Spruce [?*P. glauca* and *P. mariana*] germinated best in full sun on mineral soil. Germination was next best on rotted wood and almost non-existent on litter, moss and burn and in shade.

1182. Bormann, F. H. **Factors determining the rôle of Loblolly Pine and Sweetgum in early old-field succession in the Piedmont of North Carolina.** *Ecol. Monogr.* 23 (4), 1953 (339–58). 57 refs.

It is concluded that the superior ability of *Pinus taeda* to colonize abandoned fields in N. Carolina is due (*a*) to the superior drought resistance of its seedlings and (*b*) to the fact that seed-bearing begins much earlier than in Sweetgum (*Liquidambar styraciflua*).

1183. Eggler, W. A. **Description of a bottom-land hardwood forest in Sharkey County, Mississippi, with a possible explanation of why Red Gum fails to reproduce.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (70–1). A.P.B.

Tests on germination of seeds of *Liquidambar styraciflua* in 6 different materials from the forest floor, suggest an explanation of why the species fails to regenerate under a closed canopy. The % of healthy plants obtained was as follows: Sharkey clay 37–69%; partially decomposed fermentation layer, 22–78%; humus 16–59%; leaves, 0–41%.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos.1108, 1112, 1249, 1353–7, 1364–6, 1634, 1657.

1184. Brown, J. M. B. **Influence of shade on the height growth and habit of Beech.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (62–7 + 3 photos).

Studies of the factors affecting the early growth and form of Beech have indicated that light intensities down to about 20% of full overhead light have scarcely any effect on the rate of height growth of young Beech, but below 20% serious retardation may be caused. Forking, form of leaves, Lammas growth, and other effects of shade on form are also discussed.

1185. Brown, J. M. B. **Influence of shade on increment, stem form and health of Beech plants in the nursery.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (60–3).

A controlled experiment with different degrees of shade indicated that reduction of light has a profound influence on form, and always results in a reduction in dry-weight increase of shoot and root. 50% light did not appreciably reduce the amount of Lammas growth and forking, but heavier shading (18%, and ca. 4%, of full light) conspicuously reduced forking, but also caused deviation of the axis from the vertical so that plants were tending to a "table-topped' habit. There may be some intermediate degree of shading where improved form may be secured without too serious loss of vigour.

1186. Brown, J. M. B. **Forking in young Beech.** *Rep. For. Res. For. Comm. Lond. 1951/52*, 1953 (59).

Observation of many individual trees through the 1951 growing season showed that incipient forking is nearly always associated with injury to the leading

shoot, and that trees making renewed growth after midsummer are especially affected. A tortricid caterpillar (*Peronea ferrugana*) had previously been found responsible for serious damage to shoots in late summer and early autumn. In 1951 a gall midge of the genus *Contarinia* was found to be very prevalent in the buds and late summer sprouts in several districts. Die-back of tips in summer is not always, however, associated with evident insect injury, and it is believed that physical conditions of the atmosphere may be concerned.

The factors upon which secondary shoot extension in late summer depend are still insufficiently understood. In the rainy late summers of 1950 and 1951 such extension was very common, which suggests that soil water has a controlling influence. Shade is also concerned in some negative way. It has been observed, both under experimental conditions and in the field, that strongly shaded young Beech rarely produce Lammas shoots.

1187. VACCARONE, E. Osservazioni sulla asimmetria diametrica dei fusti di pioppo nell'allevamento di ripa. **[Observations on the excentricity of stems of Poplars growing on canal banks etc.]** In *Studi e Ricerche sulla Pioppicoltura*, Ente nazionale per la Cellulosa e per la Carta, Rome. 1953. pp. 29–41 + 1 dgm. [It.]

Two-thirds of the Poplar grown in Italy are planted in single lines along stream and canal banks, roads, field edges etc. and a high proportion of these trees are elliptical in section. A carefuly study was made of some 70 trees growing on the edge of an irrigation ditch round two sides of a field in lines running W.–E., NW.–SE., and N.–S., the trees being spaced 2·2 m. apart in the rows. It is concluded that the two factors chiefly responsible for excentricity are close spacing and growth habit. For any given variety the % of elliptical stems diminishes as the planting distance increases. At a given spacing, the variety with the more compact habit of growth shows a smaller % of excentric stems. It also appears that excentricity increases with age.

1188. KABURAGI, Z. **[Forest biological studies on wood quality. (Report 6.) The relation between slope of the ground in forest stands and excentric growth of Todo Fir in the Atsuta district of Hokkaido.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 61, 1953 (41–56). 4 refs. [Jap.e.]

Measurements were made on disks from 68 trees of *Abies* sp. Results include the following: (1) Only 3·3% of the disks tested, and none at 0–10 m. height, showed no excentricity in diameter increment, (2) Excentric growth in the lower part of the stem was more influenced by the gradient immediately round the stem than by the general direction of the slope. (3) In the lower part of the stem the direction of excentric growth was variable but in the upper part tended to be constant, taking place on the upper side of the tree in relation to the slope of the ground in trees of group A and on the lower side in trees of group B (in group A, $Z > 1$, in group B, $Z < 1$, where $Z = \frac{\text{total volume}}{\text{tree age} \times 1000}$ and $Z = 1$ represented the boundary between suppressed and higher crown classes). [Cf. *For. Abstr.* 15 (No. 625).]

1189. SUSMEL, L. Vicende di una picea: insegnamenti selvicolturali. **[The vicissitudes of a Spruce: silvicultural lessons.]** *Monti e Boschi* 4 (9) 1953 (387–95). [It.f.e.]

From the analysis of the annual rings of a 250-year-old *Picea abies* the author deduces some of the silvicultural peculiarities of this species, particularly its growing-space requirements at different stages. Adequate space is particularly important during the first 20 years. Contrary to common assumptions, Spruce can tolerate very different degrees of illumination provided that it has plenty of growing space.

181.8. Phenology

See also Nos. 1090, 1158, 1161–3, 1186.

1190. Riunione generale straordinaria a Venezia nei giorni 12–16 Settembre 1951 (Convegno fitofenologico della Società Botanica Italiana). **[Extraordinary general meeting at Venice 12–16 Sept. 1951 (Phenological Conference of the Italian Botanical Society).]** *Nuovo G. bot. ital.* (*n.s.*) 58 (3/4), 1951 (1952) (495–577). [It.] A.P.B.

Summarizes papers read at the conference, chiefly on methods of study, and fundamental research in phenology.

1191. STAEHELIN, M., and WURGLER, W. Considérations sur le repos hivernal des arbres et son interruption. **[The winter rest of trees and its interruption.]** *Annu. agric. Suisse* (*n.s.*) 2 (6), 1953 (959–69). 30 refs. [F.f.] E.M.B.

Reports (1) experiments confirming the influence of low temperatures on breaking winter rest, and (2) experiments to find the influence of certain fumigants on winter rest and dormancy. The effects of HCN are limited, but those of ethylene chlorohydrin definite enough to warrant the imposition of certain precautions in its use. [Cf. *For. Abstr.* 15 (No. 1457).]

1192. WYATT-SMITH, J. **Deciduousness of rain-forest species of the family Dipterocarpaceae.** *Malay. Forester* 16 (4), 1953 (223–4).

Notes the occurrence of deciduousness in individuals of *Shorea maxwelliana*, *S. guiso*, *S. talura* and *Pentacme siamensis*.

1193. MATHIESEN, A. **Some observations on the defoliation of trees.** *Repr.* from *Acta Horti Bergiani, Uppsala* 16, 1953 (241–55). 88 refs. [E.]

Reviews previous European phenological studies on the leaf-fall of trees and gives the result of observations made in the autumns of 1946, 1947 and 1948 in botanical gardens in Sweden and Estonia for a large number of tree species.

1194. ANDERSSON, S.-O. Om tidpunkten för den årliga diametertillväxtens avslutande hos tall och gran. **[The date of completion of annual diameter growth in Scots Pine and Norway Spruce.]** *Medd. SkogsforsknInst., Stockh.* 43 (5), 1953. pp. 27. 14 refs. [Sw.sw.e.] Price *Kr.*1·50.

Measurements were made on 1800 increment cores taken from sample plots in virgin forest in all parts of Sweden in 1941–6. The study was based on the relative late-wood % (the % of late-wood in the last annual ring in relation to the average % for the

previous 3 years) plotted throughout the period from 7 July. When the relative % no longer showed an increase, the growth of the summer ring was considered to be finished and the date was read from the curves. Results are tabulated and show that in the 6-year period, for Pine the beginning of latewood formation occurred from 12 to 24 July (mean 16 July) and the end from 12 to 24 Aug. (mean 19 Aug.); corresponding figures for Spruce were 10–22 July (mean 14 July) and 1–20 Aug. (mean 14 Aug.). A special study showed no evidence that altitude or latitude influenced the terminal date of latewood formation.

1195. **Studies of the growth of Monterey Pine.** *Rep. For. Timb. Bur. Aust. 1952*, 1953 (16–7).

Studies were made of elongation of shoots in different parts of the crown of *Pinus radiata*, with the following results: (1) The shoots varied widely in their course of growth throughout the year. Shoots that were purely foliar made a distinct burst of growth during spring and early summer and usually grew very slowly during the remainder of the year, although in some trees the leading shoot and the shoots on the top branches made a large amount of growth during summer, autumn and winter. Pollen-producing shoots exhibited a different course of growth. Except for a short period of rest in summer, elongation occurred in all seasons of the year and there was no distinct burst of spring growth. (2) On any particular tree, the time at which active spring growth commenced was practically the same for all the shoots, but the shoots in the slowly growing branches near the ground began a little later than the others. (3) On any particular tree, the time at which active spring growth ceased was, in general, later as the tree was ascended. Thus the length of the period of active spring growth in general increased with height in the tree.

1196. LEOPOLD, E. B. **Timberline growth rate and climatic correlations on Pikes Peak, Colorado.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (90). A.P.B.

A positive correlation is shown to exist between the growth rate of alpine *Picea engelmanni* and the length of the growing season.

1197. FRASER, D. A. **Ecological studies in a hardwood stand at Chalk River. I. Radial increment and ecological conditions.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (83). A.P.B.

Cambial activity at the 4-ft. level was investigated over a 5-year period in a number of trees on an 8-acre plot. Date of initiation of cambial activity showed little variation among trees of a single species but date of cessation varied somewhat. Soil moisture limits radial growth at times, but the vigour of the tree as influenced by age and crown class may outweigh this factor. Cambial activity in all trees studied had ceased by early September.

182. *Synecology, Plant Sociology: General, Principles and Methods*

1198. ROSAYRO, R. A. DE. **Ecological research in Ceylon and its application to forestry.** *Repr.* from *Proceedings of the Eighth Annual Session of the Ceylon Association for the Advancement of Science* 1953. pp. 26 + 3 dgms. 78 refs. A review of progress.

1199. NEAL, E. **Woodland ecology.** Heinemann, London. 1953. pp. viii + 107 + 4 plates. 28 refs. Price 6*s*.

An elementary textbook designed for 6th-form school children and 1st-year university students.

182.1. Palaeoecology. History of Vegetation

See also Nos. 1159, 1176, 1212, 1854, 2119.

1200. PIGOTT, C. D., and WALTERS, S. M. **Is the Box tree a native of England?** In *The Changing Flora of Britain*, Botanical Society of the British Isles, c/o Department of Botany, The University, Oxford. 1953 (184–7 + 1 plate). 9 refs. O.B.D.

A review of evidence based on the origin of the name 'Box', the distribution and status of Box in Europe, and the history of Box in France and England. The author suggests that there was a limited entry into Britain in the Boreal period, with a restricted survival through the Atlantic forest maximum, and a secondary spread in the dry Subboreal, facilitated by the Neolithic forest clearance.

1201. SCLAFERT, T. Les Monts de Vaucluse: l'exploitation des bois, du XIII[e] à la fin du XVIII[e] siècle. **[The mountains of Vaucluse: exploitation of the woodlands from the 13th to the end of the 18th century.]** *Rev. Géogr. alp.* 39 (4), 1951 (673–707). [F.f.] O.G.

The present garrigue type of vegetation is secondary, the original forests having been largely destroyed by charcoal-burning and unrestricted grazing, the history of which is given in detail.

1202. NICOD, J. Sur le rôle de l'homme dans la dégradation des sols et du tapis végétal en Basse-Provence calcaire. **[The rôle of man in the degradation of the soils and vegetation of the calcareous parts of lower Provence.]** *Rev. Géogr. alp.* 39 (4), 1951 (711–48 + 7 photos). Refs. in footnotes. [F.f.] O.G.

From the 17th century, the pressure of population led to the regression of the natural Oak (*Q. coccifera* and *Q. ilex*) forest and its replacement by garrigue. Although the area of forest is once more increasing, the process of soil degradation continues under the artificial Pine (mainly *P. halepensis*) stands.

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 1211, 1212.

1203. CORMACK, R. G. H. **A survey of coniferous forest succession in the Eastern Rockies.** *For. Chron.* 29 (3), 1953 (218–32). 10 refs.

In the eastern Rockies the most striking and important feature of the forest cover is the disturbance produced by fire. The general tendency is for the burned area to return to the original tree cover, but the trend of forest succession and the rate at which it proceeds is not always the same. In the present paper two general trends of coniferous forest succession are recognized: (1) Pine and Spruce to

climax, and (2) Pine to climax. Each trend is divided into 4 stages, originating in a recent burn and ending in the climax coniferous forest; the last two stages are the same for both trends. Each stage is named after the most characteristic species of the ground vegetation. Usually these are also the most abundant and the most frequent species. The general nature of the forest soil is noted for each stage. *From author's abstract.*

182.3. Units of Vegetation (Associations etc.)

1204. Chevalier, A.; Guinier, P.; Aubréville, A. Ce qu'il faut penser des associations végétales du système J. Braun-Blanquet. **[Thoughts on Braun-Blanquet's plant associations.]** *Rev. int. Bot. appl. Agric. trop.* 33 (369/370), 1953 (323–34). [F.] P.R.

A series of papers criticizing the system, in general, and with particular reference to tropical Africa.

1205. Gaussen, H. La hêtraie sans hêtre. **[The *Fagetum* without *Fagus*.]** *Rev. for. franç.* 5 (10), 1953 (650–2). [F.]

Discusses the anomalies and absurdities arising from the current method of naming plant associations in conjunction with the botanical rules of priority.

182.4. Layer Communities

1206. Randall, W. E., Jr. **Water relations and chlorophyll content of forest herbs in southern Wisconsin.** *Ecology* 34 (3), 1953 (544–53). 22 refs. [University of Illinois, Urbana, Ill.]

182.5. Synecological Measurements and Methods

1207. Bormann, F. H. **The statistical efficiency of sample plot size and shape in forest ecology.** *Ecology* 34 (3), 1953 (474–87). 14 refs. [Emory University, Georgia.]

A method is described, and applied to an Oak/Hickory forest, whereby statistical variance can be used to determine the most favourable size and shape of plot for sampling a natural plant population. From this study it is inferred that some form of rectangular plot should be used and that the longest axis of the plot should cross any observed contour or soil or vegetation banding.

187. *Vegetation Types*

See also Nos. 1031–3, 1375.

1208. Evans, F. **A remnant of primeval forest.** *Antiquity* 27 (107), 1953 (167–9). O.G.

History and short description of 124 acres of untouched primeval woodland at Allt y Rhiw in the Common of Coity Wallia, Glamorgan. The Oaks (*Quercus sessiliflora*) vary from ca. 15 ft. in the more exposed, to 25–50 ft. in the more protected parts.

1209. Scamoni, A. Waldgesellschaften und Waldstandorte dargestellt am Gebiet des Diluviums von Mecklenburg, Brandenburg, Sachsen-Anhalt und Sachsen. **[Forest plant communities and forest sites as represented in the diluvial region of Mecklenburg, Brandenburg, Saxony-Anhalt and Saxony.]** Akademie-Verlag, Berlin. 1951. pp. [vi] + 108 + 2 folding tbls. 66 refs. [G.]

A study in regional ecology as the basis of silviculture, summarizing the present state of knowledge for this part of Germany under the heads: climate; natural distribution of important tree species and species of the ground flora; geology; division into growth regions (on the basis of climate and geology); criteria in the choice of species (with special reference to the importance of soil types); plant sociology (descriptions of the forest types, influence of human activities upon the ground flora); major site 'forms' (*Standortsformen*), for which the nature of the region dictates a primary classification by edaphic factors, e.g. presence and depth of loam, sand or gravel; influence of groundwater, including its nutrient content and its movement or stagnation; seasonal alternation of wet and dry conditions). A brief note is appended on the desirability of linking up mensurational studies with the types distinguished on an ecological basis. The following tabular summaries, among others, are provided: (*a*) forest types, indicating natural tree species, tree species useful from the economic and biological points of view, and the site 'form' with which the forest type is normally associated; (*b*) site 'forms', indicating the associated forest types and soil types; and (*c*) suitability of individual tree species for use as main or subsidiary species, according to site 'forms', including an indication of sites on which a particular species should *not* be grown.

1210. Scamoni, A. Über die Verbreitung der natürlichen Waldgesellschaften im Gebiet des Diluviums der DDR. **[Distribution of the natural forest communities in the diluvial region of the German Democratic Republic.]** *Arch. Forstw.* 1 (3), 1952 (153–60). 7 refs. [G.]

Gives a map showing the original natural distribution of (*a*) edaphic communities: Alder, Pedunculate Oak/Hornbeam, floodland forest (Auewald), Beech/Pedunculate Oak/Hornbeam, Pedunculate Oak/Birch and Beech/Pedunculate Oak; (*b*) climatic communities: Beech/Sessile Oak, Sessile Oak, Sessile Oak/Hornbeam/Lime, Pine/mixed forest and Sessile Oak/Birch in 7 forest regions extending from Mecklenburg to Magdeburg. The edaphic (mainly groundwater), geological and climatic factors, and the present cover (arable, pasture, conifers etc.), are discussed.

1211. Priehäusser, G. Über die Entwicklung von Auen, Filzen und anderen Waldvernässungen im Bayerischen Wald. **[Development of fen and bog and other forest waterlogging types in the Bavarian forest.]** *Mitt. StForstverw. Bayerns* No. 27, 1952 (9–71). 16 refs. [G.]

The Bavarian State forests contain 2163 ha. of fen and bog but this figure includes the numerous smaller waterlogged areas that could carry higher-yielding and windfirm stands. The drift geology and soil materials are discussed in great detail with a key to 28 surface types and a classification by glaciation, colour and agency (ice, frost etc.). The zonation and development of the *Carex rostrata* fen to

Eriophorum/Sphagnum bog is described. The associated trees and the particular requirements of Norway Spruce, Silver Fir, *Betula pubescens* and *Alnus glutinosa*, and drainage measures and aims are discussed. Ash, *A. glutinosa* and *B. pubescens* are valuable auxiliaries. The drainage of *Sphagnum* bogs is considered uneconomic. The effects of drainage on the humus and gley bodies, on the plant life and the forest stands are reviewed.

1212. Vogtherr, J. Das forstlich-pflanzengeographische Waldbild des Nürnberger Reichswaldes jetzt und in der Vergangenheit. [**The plant geography of the Nürnberg State Forest now and in the past.**] *Mitt. StForstverw. Bayerns* No. 27, 1952 (93–169 + 8 photos + 1 dgm. + 1 map). 31 refs. [G.]

Based on 25 years' work, including ca. 600 inspections, a picture of the original forest is built up. The present growing stock is 98% softwood by volume; the forest falls within the European floral province (Scots Pine, *Tilia parvifolia, Sorbus aucuparia, Prunus padus*) with west central elements (Beech, Hornbeam, Sycamore and Field Maples, *Tilia platyphyllos*) and the easterly ranging Pedunculate Oak, Norway Maple, Ash, Common Alder, Birch and Hazel. Norway Spruce has come in from the north and Silver Fir from the mountains. Soils are brown forest, A(B)C, podzols, ABC, and fen AB(G)C. Plant lists covering 38 sites in pure and mixed woods are given from stands of Pine, Spruce, Oak (up to 286 years), Beech, Hornbeam, Lime, Silver Fir and Birch, with very complete site-factor detail, both silvicultural and ecological. The brown forest soils have been podzolized by bad practice, above all by the replacement of mixed forest on AC profiles by pure Pine and Spruce. Enough relict vegetation survives to show the richness of the forest before the advent of man, and the distribution of the main timbers at that time is detailed site by site. Mixtures suitable for replanting these sites are discussed. With the now accepted policy of bringing the forest over to more natural conditions the site unit is the frame within which this work should be organized. Finally the original vegetation is described and linked up with the classification of Tüxen, Hartmann and others. The forest belongs to the great climax region of Oak/mixed forest and shows two edaphic para-climaxes: (1) the *Querceto-Betuletum* without Beech on podzolized rust-coloured forest and heath soils with ABC horizons; (2) the *Querceto-Carpinetum* on fresh soils with AC or A(B)C horizons. An appendix from an unpublished thesis by *M. Ott-Eschke* states that pollen analyses from 7 bogs in this forest show Rudolph's successional periods—Pine/Birch, Pine/Hazel, Oak/mixed forest/Hazel, Beech, secondary Pine.

1213. Berghen, C. van den. Contribution à l'étude des groupements végétaux notés dans la vallée de l'Ourthe en amont de Laroche-en-Ardenne. [**Contribution to the study of the plant communities observed in the Ourthe valley above Laroche-en-Ardenne.**] *Communication, Centre de Cartographie Phytosociologique et Centre de Recherches Écologiques et Phytosociologiques de Gembloux* No. 20, 1953. pp. 82 + 1 map + 3 plates). 23 refs. [F.] (*Repr.* from *Bull. Soc. Bot. Belg.* 85, 1953 (195–277).)

1214. Borja Carbonell, J. Estudio fitográfico de la Sierra de Corbera (Valencia). [**The vegetation of the Sierra de Corbera (Valencia).**] *An. Jard. bot. Madrid* 9, 1948–9 (1950) (361–477 + 11 photos). 35 refs. [Span.] O.B.D.

(1) A list of species with notes on their habitat; (2) descriptions of the plant associations of the region.

1215. Bellot, F. Sinopsis de la vegetación de Galicia. [**Synopsis of the vegetation of Galicia.**] *An. Inst. bot. A. J. Cavanilles* 10 (1), 1950 (1951), (389–424 + 20 plates). 15 refs. [Span.] O.B.D.

Describes the large plant communities according to the classification of Brockmann-Jerosch and Rübel, and the principal associations within the communities according to the system of Braun-Blanquet. A key to the main associations is included.

1216. Stojanov, N., and Ahtarof, B. Rastitel-jijí pokrov gorji Golo Bardo v zapadnoĭ Bolgarii. [**The vegetation of the Golo-Bardo range in western Bulgaria.**] *C.R. Acad bulg. Sci.* 4 (1), 1951 (21–4). [Bulg.g.] E.M.B.

The range is now largely deforested owing to over-exploitation. The remains of the primitive vegetation is *Carpinetum betuli. C. duinensis* and the *Querceta* are also represented, but to a lesser extent.

1217. Em, H. Rastitelnosta i dendroflorata meǵu Ovče-Pole i reka Pčinja. [**Vegetation and tree flora between Ovče Pole and Pčinja river.**] *Godišn. šum. nauč. opit. Inst., Skopje* No. 1, 1951 (9–32 + 3 maps). 6 refs. [Maced.g.]

The vegetation types and peculiarities of the woody flora are described with a view to any future meliorative measures. The area is one of the most arid in Macedonia, with annual precipitations of 500–600 mm., maximum rain in May, minimum in July. Lists 40 tree and shrub species suitable for all 5 major communities in the area.

1218. Nikolovski, T. Prinos kon poznavanje na kostenovite šumi vo N. R. Makedonija (*Castanetum sativae macedonicum*). [**The *Castanetum sativae macedonicum.***] *Godišn. šum. nauč. opit. Inst., Skopje* No. 1, 1951 (187–94 + 2 gphs. + 1 tbl.) 20 refs. [Maced.g.]

A plant-sociological analysis of *Castanea sativa* stands in the Macedonian mountains, altitude range 200–1100 m., soil pH 5·55–7·62. The species is accompanied by *Quercus sessiliflora* and sometimes by *Juniperus communis*.

1219. Soó, R. de. Les associations végétales de la moyenne Transylvanie. I. Les associations forestières. [**The plant associations of central Transylvania. I. The forest associations.**] *Annales Historico-Naturales Musei Nationalis Hungarici, Budapest* (*n.s.*) 1, 1949/50 (1951) (1–71 + 13 tbls.). 92 refs. [F.russ.] I.I.E.

1220. Sočava, V. B., Isačenko, T. I., and Lukičeva, A. N. Obščie čerty geografičeskogo

rasprostranenija lesnoĭ rastiteljnosti Zapadno-sibirskoĭ nizmennosti. **[General outlines of the geographical distribution of the forest vegetation of the W. Siberian lowlands.]** *Izvestija Vsesojuznogo Geografičeskogo Obščestva, Leningrad* 85 (2), 1953 (125–38 + sketchmap). 20 refs. [Russ.] X.

A brief general review, proposing the recognition of 5 latitudinal zones from the open conifer stands bordering the tundra, through the *taiga* (conifer forest and bogland) to the deciduous zone (Birch and Aspen) fringing the steppe country. Three major geobotanical regions are recognized, passing from the western (predominantly Pine), through the central (chiefly bog) to the eastern (with much more Spruce and Fir). A sketchmap (scale ca. 1 : 10,000,000) of the chief vegetation types is included.

1221. WYATT-SMITH, J. **A note on the vegetation of some islands in the Malacca Straits.** *Malay. Forester* 16 (4), 1953 (191–205 + 6 photos). 8 refs.

1222. LÉONARD, J. Botanique du Congo belge. 1. Les groupements végétaux. **[Botany of the Belgian Congo. 1. Vegetation units.]** *Repr.* from *L'Encyclopédie du Congo Belge*, Editions Bieleveld, 22 Rue de la Concorde, Bruxelles. 1, 1950 (345–89). [F.] X.

Gives 16 physiognomic or edaphic types which include 67 associations, grouped in 27 alliances, 13 orders, and 4 classes. The divisions listed include only those considered sufficiently well known to be given a place in Braun Blanquet's system. Type No. XII, *forêts claires* [Shantz's *dry forest*], is divided into 2 orders:—(*a*) the *Isoberlinietalia dokae* and (*b*) the *Pseudoberlinio-Brachystegietalia spiciformis*. This latter is divided into two alliances (1) *Xerobrachystegion* and (2) *Mesobrachystegion*.

1223. ACOCKS, J. P. H. **Veld types of South Africa (with 5 small vegetation maps and accompanying veld type map).** *Mem. bot. Surv. S. Afr.* No. 28, 1953. pp. v + 192 + 7 maps. 21 refs.

1224. MARTIN, P. S. **Vegetation of the Gomez Farias region, northern limit of humid tropical forests in eastern Mexico.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (92–3). A.P.B.

The following classification of 8 vegetation types was drawn up, arranged in order of increasing humidity within each group. *Tropical*: thorn forest, tropical deciduous forest, tropical evergreen forest, cloud forest. *Temperate*: thorn steppe, chaparral, montane low forest, montane mesic forest. Of the 4 tropical formations, only thorn forest occurs north of Tamanlipas in Nuevo Leon. Tropical deciduous forest is widespread in the Gomez Farias region, reaching an altitude of 900 m., but it probably does not extend farther north than Llera. Tropical evergreen forest is poorly represented. Cloud forest is well developed on the eastern side of the Sierra Madre Oriental from 900 to 1700 m., but the Gomez Farias region is its northern limit.

1225. ASPREY, G. F., and ROBBINS, R. G. **The vegetation of Jamaica.** *Ecol. Monogr.* 23 (4), 1953 (359–412). 78 refs.

1226. SHANKS, R. E. **Forest composition and species association in the Beech-Maple forest region of western Ohio.** *Ecology* 34 (3), 1953 (455–66). 38 refs.

Deals largely with the use of data from land-survey records. [Cf. *For. Abstr.* 13 (No. 1965).]

1227. WARD, R. T. **The nature of the Beech border in southern Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (68–9). A.P.B.

1228. WHITFORD, P. B., and SALAMUN, P. J. **A forest survey of the Milwaukee area.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (69). A.P.B.

1229. WARE, G. H. **The floodplain forest of the Wisconsin River.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (70). A.P.B.

Acer saccharinum, *Betula nigra*, *Ulmus fulva* and *Quercus bicolor* are the most important species of this region. Reproduction of *U. fulva* exceeds that of any other species.

1230. WOODIN, H., and LINDSEY, A. A. **Pinyon-Juniper east of the Continental Divide, as analyzed by the line-strip method.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (84). A.P.B.

Analyses were made at 24 stations and some results are cited.

1231. CHURCHILL, E. D. **A provisional classification of plant communities of Umiat, Alaska.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (90–1). A.P.B.

Five types on the basis of quadrat data from 80 stands, are recognized: (1) the dwarf-shrub heath type, which is the most widespread; (2) the frost-scar collective type; (3) the *Salix* spp. type; (4) the *Alnus crispa* type; and (5) the *Carex aquatilis* marsh type.

1232. SIGAFOOS, R. S. **Ecological characteristics of Spruce forests on Seward Peninsula, Alaska.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (91). A.P.B.

1233. MANN, F. G. Esquema ecológico de selva, sabana y cordillera en Bolivia. **[An ecological outline of forest, savanna and high mountain in Bolivia.]** *Publicación del Instituto de Geografía, Facultad de Filosofía, Universidad de Chile* No. 3, 1951. pp. 236 + 70 plates. 26 refs. [Span.e.g.]

The study deals with both animal and plant communities in forest, savanna and high mountain in turn. In each section chapters are devoted to (1) the extent of the formation, (2) physiognomy, and (3) edaphic factors. English and German summaries are given to each section.

1234. MOORE, C. W. E. **The vegetation of the south-eastern Riverina, New South Wales. I. The climax communities. II. The disclimax communities.** *Aust. J. Bot.* 1 (3), 1953 (485–567 + 19 plates + 1 map). Many refs. O.B.D.

2. SILVICULTURE

See also Nos. 1152, 1655–6, 1713.

1235. KITCHINGMAN, G. D. **The literature of British silviculture.** *Quart. J. For.* 47 (4), 1953 (254–62). 14 refs.

Notes on the principal silvicultural classics. [Cf. *For. Abstr.* 14 (No. 215).]

1236. DAWKINS, H. C. **Territorial silvicultural research plan 1953.** Forest Department, Uganda. 1953. pp. 42.

[Cf. *For. Abstr.* 13 (No. 1784).] Follows the recommendation of the British Commonwealth Forestry Conference 1952 in prescribing a definite programme, modern experimental designs and suitable permanent records. Territorial priorities (subject to local variation) are detailed.

1237. WIGG, L. T. **Problems of dry forest silviculture in Tanganyika.** *Emp. For. Rev.* 32 (3), 1953 (212–21 + 6 photos). 11 refs.

Cf. *For. Abstr.* 14 (No. 1090).

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

221. *High Forest Systems*

See also Nos. 1662, 1668, 1680.

1238. MCCLAY, T. A. **Growth, mortality, and regeneration after cutting in Loblolly Pine pulpwood stands.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 28, 1953. pp. 15. 8 refs.

Tabulated data are given for results, after 9 years, of different forms of treatment from a series of 0·4-acre plots in 25- to 30-year stands. Heavy low thinning produced greatest financial returns during the period, followed in order by shelterwood felling, moderate low thinning, leaving 12 or 4 seed trees per acre, and felling to a 7-in. diam. limit. Seed-tree and shelterwood methods both failed to produce adequate Pine regeneration within a reasonable time. Felling to a 7-in. limit was the least favourable of the methods because of a relatively high mortality and low growth rate of reproduction.

1239. LJVOV, P., PASTUHOVA, P., and VIŠNJAKOVA, A. Gruppovye semenniki pri mehanizirovannoĭ trelevke. **[Leaving seed-trees in groups during mechanized skidding.]** *Lesn. Prom.* 12 (11), 1952 (16–7). [Russ.] Translation by A. Koroleff in *For. Chron.* 29 (2), 1953 (137–8).

Instead of single scattered trees, recommends concentrating the seed-trees in the corners of the square felling areas; the groups so retained present the form of four-pointed stars whose rays extend along the site boundaries; the area under seed-trees forms 9% of the total area, and the groups occupy 70% of the site perimeter.

1240. HILEY, W. E. **Irregular forestry. [With discussion.]** *Quart. J. For.* 47 (4), 1953 (231–8).

'Irregular forestry' is defined as 'forestry in which various silvicultural systems are jumbled together'. Its advantages and dangers are discussed.

1241. ŠAFAR, J. Preborna šuma i preborno gospodarenje. **[Selection forest and selection management.]** [*Publ.*] *Inst. šum. Istraž., Zagreb* No. 2, 1948. pp. [3] + 100. 100 refs. [Croat.croat.] Price *Din.*64.

A book based on 100 papers and publications, one-half of which are Jugoslav. The general introduction, and the sections on the constitution and characteristics of selection forest, and management techniques, are fully illustrated by photographs, tables, and graphs, many of which refer to Jugoslav selection forests. The method of management for unmanaged and primeval-type forests during the conversion period, elaborated by S.Šurič (*Šum. List*, 1933), is treated in some detail.

1242. ŠAFAR, J. Die Plenterwälder in Kroatien. **[Selection forests in Croatia.]** *Schweiz. Z. Forstw.* 104 (10), 1953 (499–507). [G.f.]

The selection forests of Croatia occupy 19% of the forest area of the republic but contain 42% of the growing stock. The forests (mainly Beech and Silver Fir) are described. Topography, soil (mainly Karst) and climate all dictate the continuance of selection methods in this area.

1243. U KYAW ZAN. **Note on the effect of 70 years treatment under selection [and improvement] system and fire protection in the Kangyi Reserve.** *Burmese For.* 3 (1), 1953 (11–8). [E.]

This forest received regular treatment under working plan prescriptions (described) from 1870 to 1941 without a break, as a result of which its value and revenue were greatly increased. The two most valuable species, Teak and Pyinkado (*Xylia dolabriformis*) were represented in almost all age classes, though Teak was scarce in the seedling and sapling stages, owing to the lush undergrowth.

1244. PLACE, I. C. M. **'Selective cutting' and the all-aged stand.** *For. Chron.* 29 (3), 1953 (248–53). 6 refs.

Recommends the abandonment of the term 'selective cutting' as being almost meaningless. Discusses briefly the possibility of using selection methods in the Spruce/Fir forests of the Maritimes and decides that they are unsuitable.

222. *Coppice, Pollarding and Lopping Systems*

See also Nos. 1367, 1671–2.

1245. La sauvegarde du chêne dans les taillis sous futaie de la Haute-Saône et du Territoire de Belfort. **[Saving the Oak in the coppice-with-standards of the Haute-Saône and the territory of Belfort.]** *For. France* No. 50, 1953 (18–9, 21). [F.] X.

Gives figures for work done, costs, and results of operations in two groups of woodland, to find and release the natural regeneration of Oak that occurs after mast years subsequent to the felling of the coppice, but perishes if not tended. Release consisted in cutting back coppice regrowth and other

vegetation with a long-handled sickle. A first release cost ca. Fr.4500/ha., and a second one ca. Fr.2000/ha.

1246. Soedibja, R. S., and Ardikoesoema, R. I. Pemandangan tentang pertjobaan hakhoutbedrijf. *Acacia auriculiformis* A. Cunn. di Maribaja (Djasinga). **[The experiment on coppice systems for *A. auriculiformis* at Maribaja (Djasinga).]** *Rimba Indonesia* 2 (6/7), 1953 (279–88). 4 refs. [Jav.E.]

In connexion with the selection of suitable species and silvicultural systems to increase the supply of firewood for large towns and tea estates, sample plots were established in Aug. 1950 in a 5-year-old plantation, and different blocks were laid out to find the system giving greatest yields on a 10-year rotation. In blocks where all trees were cut, or where standards only were left, the first inspection after 9 months showed that there had been no sprouting, and the stumps were dead. This is attributed to the exposure to sunlight. About 10% of the stumps in 2 blocks where 50 or 64% of the trees were cut had sprouts 1·00–1·20 m. high; a second inspection in Aug. 1952 showed that 50% of the sprouts had been killed by fast-growing undergrowth: the remainder had an average height of 3·7 m. Outside the sample plot, where the trees had been thinned and one branch left on each stump (*A. auriculiformis* generally having 2–5 branches below breast height), 60% of the stumps had sprouts, and by Aug. 1952 these sprouts were 4–5 m. high with 2–4 cm. diam. Retaining one of the branches not only prevented stumps from drying out but reduced competition from weeds.

228. *Constitution and Composition of Stands; Forms of Stand*

See also Nos. 1209, 1212, 1258, 1267, 1333–5, 1350–1, 1651, 1662.

1247. Aubréville, A. Une visite aux plantations de Limbo du Moyen-Congo. **[A visit to the *Terminalia superba* plantations of the Middle Congo [French Equatorial Africa].]** *Bois For. Trop.* No. 27, 1953 (3–8). [F.e.span.]

T. superba is now being planted on a large scale as a result of satisfactory trial plantings made 15 years ago. It has been shown that tall straight trees can be obtained by planting at relatively wide spacing (as much as 12 × 14 m.).

23. REGENERATION AND FORMATION OF STANDS

231. *Natural Regeneration*

See also Nos. 1075, 1181–3, 1238, 1339–40, 1354, 1356, 1477, 1533, 1556.

1248. MacDonald, J. A. B. **Natural regeneration of Scots Pine woods in the Highlands [of Scotland].** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (26–33).

Summarizes the results of a number of investigations, and attempts to analyse the factors inhibiting natural regeneration in most of the areas studied. Recommendations are given for obtaining regeneration, conditions for which become rapidly more unfavourable each year after a seeding felling has been made. The recommendations are to thin fairly heavily so as to get good crowns on the trees some years before regeneration is required, to wait for a good seed year before making the felling and, when this is made, to burn the heather if possible and cultivate the ground with disc or tine harrows. If seeding is successful, apply P and possibly N fertilizers to selected seedlings. If not successful by the end of the second year, spend no more money on trying to get natural regeneration, but plant up the unstocked areas.

1249. Voegeli, H. Beitrag zur Frage der Föhrenverjüngung und -Erziehung. **[The regeneration and improvement of Pine.]** *Schweiz. Z. Forstw.* 104 (11/12), 1953 (561–94 + 2 plates). 34 refs. [G.f.]

The author has studied a number of Scots Pine originating in coppice with standards in the Rheinau and Ellikon region, in order to obtain data bearing on the production of large, good-quality timber free from knots. Results of analyses (measurement of size of knots, length of terminal shoot, diameter and length of branches on the merchantable log), which were compared with observations made in natural Pine regeneration, permitted the following conclusions: (1) Clear felling is not necessary for regeneration. (2) Young Pine will tolerate for several years a relatively dense canopy of suitable forest species without serious diminution of vigour. (3) Limitation of illumination for some years in regeneration under shelter and in close stands, permits the production of élite stems without branches. (4) The silvicultural measures that favour the production of good-quality Pine also satisfy the demands of soil conservation. The author shows that the relative knottiness of a stem can be approximately assessed from a cross-section by use of the formula $L = K \times 50$ where L is the minimum knot-free length in metres, and K is the diameter in mm. of that part of the cross-section that has annual rings 2 mm. or less in breadth.

1250. Mallam, J. C. **Regeneration of the high forest [in Nigeria].** *Inform. Bull. For. Dep. Nigeria* No. 11, 1953 (1).

Ample reproduction of economic species was found in 1948 and 1952 in part of the Gambari Forest Reserve cut over for fuelwood in 1944 and 1947, in spite of the dense tangle.

1251. Régénération naturelle de peuplements exotiques. **[Natural regeneration of exotic stands.]** *Rapp. Com. spéc. Katanga 1952*, 1953 (60). [F.]

Exceptional regeneration of 2000 plants/sq. m. at the end of the 1951/52 rains followed the 1951 burn of ca. 8 ha. of *Cupressus lusitanica* at Lubumbashi. After the dangerously long dry season of 1952 these plants were extremely vigorous, showed little mortality and identical growth whether in full sun, or full or partial shade. Élite stems were over 25 cm. high. Direct sowings are being tried. Pine stands, principally *P. radiata*, burned at the same time showed no regeneration.

1252. Expérience de régénération naturelle du cyprès. **[Natural regeneration of *Cupressus* spp. [in the Belgian Congo].]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (119–20). [F.]

Different degrees of regeneration felling were tested in plantations of exotic Cypresses. At the end of the year best regeneration was obtained on plots from which half the standing volume had been removed. Clear felling gave the next best results but the adventitious vegetation did not give the young reproduction sufficient protection against insolation. Removal of $\frac{1}{4}$ or of $\frac{1}{8}$ of the standing volume, and clear felling followed by burning, gave no established regeneration; the first two because of insufficient illumination and the last because of the destruction of seed.

Some measurements were made of taper in *Cupressus* plantations in this region, and average figures are given by 15-cm. classes.

1253. Nikolovski, T. Tipovi na šikari vo N. R. Makedonija i regeneracija na istite so resurekcija. **[Maquis types in Macedonia and their regeneration from coppice.]** *Godišn. šum. nauč. opit. Inst., Skopje* No. 1, 1951 (75–114). 10 refs. [Maced.e.]

The maquis of Macedonia can be divided into that of: (1) the evergreen-woods zone, (2) the *Carpinus orientalis/Ostrya carpinifolia* zone, (3) the mesophytic Oak woods, and (4) *Fageta*. Results are given of coppicing trials made in experimental plots belonging to different forest communities: (*a*) *Querceto-Carpinetum*, optimum coppicing period Dec.-Feb. and late autumn, (*b*) *Querceto-Carpinetum orientalis*, Oct. and Jan.

232. *Artificial Regeneration*

232.1. Choice and Trial of Species, Races etc.

See also No. 1217.

1254. Tomašević, Đ. Prilog proučavanju izbora vrsta drveća za pošumljavanje Grdeličke Klisure. **[Selection of tree species for the afforestation of the Grdelička Klisura.]** *Šumarstvo* 6 (4), 1953 (323–31). 21 refs. [Serb.f.g.]

Describes suitable species, specially recommending the community *Quercus conferta—Q. cerris*. [Cf. *For. Abstr.* 14 (No. 2061).]

1255. Panov, A. *Ailanthus glandulosa* Desf. **[*A. altissima*]**. *Šumarstvo* 6 (2), 1953 (116–27). [Croat.e.g.]

Recommends introducing *A. altissima* as a regular forest species into Serbia, offers some observations on its behaviour in Serbia, and gives data on local germination tests.

1256. Wieshugel, E. G. *et al.* **Testing tree progeny: a guide prepared by the Subcommittee on Progeny Testing; with Appendix.** *Tech. Note Tenn. Vall. Auth.* No. 14, 1952. pp. 21 + 46 + dgms. 21 refs.

The purpose of the guide is to aid research workers in choosing methods of testing and experimental designs that will produce statistically sound results by the simplest possible means. The appendix gives programmes ['working plans'] for several projects, viz. (1) standardized programme for local tests of seed source; (2) programme for co-operative exploratory study on Loblolly Pine seed-source plantings; (3) programme with comments, for a Black Locust progeny test [cf. *For. Abstr.* 9 (No. 2085)]; (4) preliminary programme for exploratory study for disease or insect resistance, progeny-test plots of Chestnut, and an experimental design for F_1 progeny in White Pine blister-rust resistance tests.

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 1251–2, 1655–6.

1257. Weck, J. Ist in Island Aufbau von Wirtschaftswald möglich? **[Is the establishment of production forest possible in Iceland?]** *Z. Weltforstwirt.* 16 (5), 1953 (180–3). 5 refs. [G.]

Discusses Iceland's forest history, its climate, the success of exotics introduced within the last 50–60 years, other species and provenances worthy of trial, and proposals for afforestation of 40,000 ha. with conifers, sufficient to cover the timber needs of the existing population.

1258. Cunningham, G. C. **Growth and development of coniferous plantations at Grand'Mère, P.Q.** *Silv. Res. Note For. Br. Can.* No. 103, 1953. pp. 28.

Pure Pine (*Pinus sylvestris, P. banksiana, P. resinosa*) plantations are doing well, but pure Spruce (*Picea abies* and *P. glauca*) and mixtures of Spruce and Pine are not a success, on abandoned farmland on the marine plain of Quebec.

1259. Barber, J. C. **Tree planting at the Bent Creek Experimental Forest [, N. Carolina].** *Sta. Pap. Stheast. For. Exp. Sta.* No. 27, 1953. pp. 11. 2 refs.

Contains notes on the history of the arboretum and its soil and climate, and tabulated data on growth of trees planted inside and outside it, of *Pinus resinosa* from different sources and of recent plantings of different species. Among introduced species *Chamaecyparis thyoides*, *Pinus taeda* and *P. rigida* var. *serotina* may prove valuable.

1260. Williamson, J. Observaciones sobre el cultivo de las coníferas en la provincia Eva Perón. **[Notes on the cultivation of conifers in Eva Perón province.]** *Rev. argent. Agron.* 20 (2), 1953 (96–104). [Span.] E.M.B.

Notes on the climate of the pampas region west of Buenos Aires and south of Córdoba and San Luis, with an alphabetical list of conifers growing in this region, accompanied by brief notes on their growth, survival and silvicultural characters.

1261. Weber, W. Posibilidades económicas de algunas especies forestales exóticas en Chile. **[Economic possibilities of some exotic forest species in Chile.]** *Chile Maderero* 3 (3), 1953 (2–3). [Span.]

The most promising exotics in the experimental plantations of the Cía Molinera Villarica have proved to be *Pseudotsuga taxifolia*, *Pinus caribaea* and *P. sylvestris*. Notes on their growth rates are presented.

1262. Chapman, G. W. **The cultivation of *Eucalyptus* in Cyprus.** Forest Department, Nicosia, Cyprus. 1952. pp. 3 + 3 gphs. Limited distribution: a paper prepared for the 3rd session of the Mediterranean Sub-commission of the European

Commission on Forestry and Forest Products held at Istanbul in May 1952.

1263. Goor, A. Y. **[The Eucalyptus study tour in Australia.]** *La-Yaaran* 3 (2/3), 1953 (47–54, 81). [Heb.e.]

[Cf. *For. Abstr.* 15 (No. 2176).] Species recommended for trial in Israel are *E. gomphocephala*, *E. multiflora*, *E. ambulata*, *E. sideroxylon*, *E. saligna*, *E. cladocalyx*, *E. maculata*, *E. paniculata*, and *E. prophnicia*. Some of the species, including Acacias, of the mallee should be tried for arid and semi-arid regions. Natural regeneration and direct sowing are not suitable for Israel. *From author's summary.*

1264. Berlan, E. L'*Eucalyptus* à Addis-Abeba et au Choa. **[The *Eucalyptus* at Addis Ababa and on the Shoan plateau.]** *Rev. Géogr. alp.* 39 (3), 1951 (571–7 + 4 photos). 7 refs. [F.f.] O.G.

An account of the introduction and diffusion of Eucalypts (mainly *E. globulus*) in Abyssinia, silvicultural methods, and uses of the wood (mainly fuel and hut poles).

1265. **Data from plantations—Sapoba.** *Inform. Bull. For. Dep. Nigeria* No. 12, 1953 (2–3).

The heights and girths of the arithmetical mean sample trees of *Terminalia ivorensis* (24 years) and *Cedrela mexicana* (23 years) taken on $\frac{1}{5}$-th acre plots were 115 ft. and 50 in. and 110 ft. and 50·5 in. respectively.

232.12. *Races and Provenance Trials*

1266. Edwards, M. V., and Pinchin, R. D. **Provenance studies.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (43–57).

A full account is given of the International Larch [*L. decidua*] Provenance Experiments initiated by I.U.F.R.O., in which 44 different seed lots were raised and planted out in 1946 in 5 centres in England and in 1947 in one site in Scotland. Measurements at 5 years old indicated that the lots showing greatest early vigour came from Moravia and Upper Silesia, and were ahead of strains that had been established in Great Britain for one or more generations. The least suitable origins, showing high casualties and poor growth, came mainly from the Italian and Swiss Alps. In general, strains from higher elevations grew more slowly than those from lower elevations, though there were some exceptions, notably a strain from Lamerau in the Austrian Alps from an elevation of 2300 ft. [Cf. *For. Abstr.* 13 (No. 2897); 14 (No. 254).]

Japanese Larch provenance trials have so far shown no consistent variations between provenances, though there are great differences between individual trees within provenance as regards vigour and form.

In Scots Pine, trials of Norwegian coastal provenances have been laid down to try to find a strain that will grow better and prove more resistant to wind blast than local strains, when planted in west coastal districts of Scotland. A report on some older Scots Pine provenance trials is given, which confirms the superiority of indigenous origins over imported ones. Races from Finland, Georgia, and Spain were particularly poor.

1267. Mörmann, P. Die europäische Lärche in Baden: Herkunft, Entwicklung und Anbauaussichten. **[European Larch in Baden: provenance, development, and prospects for its cultivation.]** *Forstwiss. Forsch.* No. 2, 1953. pp. 71. 58 refs. [G.g.] Price *DM*.8·50.

A review, completed in the main in 1944 but delayed by the war, based on official archives, published literature, replies to a questionnaire, and the author's own experience. Part I is historical. Part II deals with past experience of plantations (failures and their causes, problems of mixtures, site, wood utilization, and injuries—with a special note on Münch's views on late frost damage as the primary cause of widespread fatal disease at various periods). Part III draws silvicultural conclusions for the region.

The Larch plantations of Baden have all been of alpine provenances. Though Münch's 'Larch disease' has been troublesome locally, most of the stands have been healthy. Very serious mortality has, however, occurred at altitudes over 700 m. in the Schwarzwald, and here it seems useless to make further trials. Trials of Larch as a gap-filler in hardwood regeneration under the irregular shelterwood system have also been disappointing. Admixture of Larch with pure Norway Spruce cannot be justified, as the Larch will not tolerate the resulting crown restriction from the pole stage on. Mixtures with Scots Pine plus varying proportions of Beech—the commonest form of mixture in Baden—have been much more successful, and in mixture with hardwoods (Oak, Beech) results have been very promising, though requiring the closest supervision of thinnings. As regards value, it is only in the higher diameter classes that Larch is superior to Pine, the latter having the higher volume yield; hence Larch will usually pay only on the better sites where management can aim at the production of large timber. Experience appears to show that in Baden rotations of up to 150 years are possible without serious risk of premature stem and butt rot, with the exception of shallow soils over limestone, where *Fomes annosus* has sometimes occurred as early as the pole stage, and *Polyporus schweinitzii* has been found, though more rarely. The fact that Larch has thriven on the whole in Baden is attributed to favourable provenance (lower and middle altitudes in the eastern Alps).

1268. Robak, H. Hvordan sikrer vi best forsyningen av mellomeuropeisk granfrø til skogreisingen. **[Supplies of central European Spruce seed for afforestation [in Norway].]** *Tidsskr. Skogbr.* 61 (9), 1953 (323–38). [Nor.]

Describes briefly a tour through Germany, Austria and Switzerland, discusses collecting regulations of some of the big seed firms there, gives climatic data for districts in Germany and Norway, and concludes that seed from Bavaria should come from altitudes over 800 m. and from the Black Forest over 700 m., while from the Harz seed need not be from altitudes above 700 m.

1269. Langlet, O. Några data från det internationella granproveniensförsöket av 1938 i Sverige. **[Some data from the 1938 Norway Spruce**

provenance investigation in Sweden.] *Skogen* 40 (11), 1953 (238–9, 244–5). [Sw.]

Analyses the results of measurements on 14-year-old trees of different provenance planted in S. Sweden. The provenances tested were of fairly even distribution from the range of Spruce in Europe with the exception of Russia. Results are tabulated to show for the 10 best trees in the lot of 64 (or a proportionate number when a different total number was used) the mean height, diameter, volume and branch length, and for all trees the 'diameter sum' (trees were divided into 1-cm. classes, class 0 = 1–9 mm., class 1 = 10–19 mm. etc., the number of trees in each class being multiplied by the class number and the figures obtained added to give the 'diameter sum' of the lot). An investigation on date of development in the spring, made on the research area at Bornsjö near Stockholm, showed that trees of northern provenance started their development earlier than more southerly provenances, but that there was no clear division into 'early' and 'late' groups. When, however, average volume was plotted against average branch length of the 10 best trees in each provenance the material fell clearly into 2 groups, provenances from Scandinavia, Finland, Latvia, high altitudes in S. Germany and Switzerland, and N. Poland having relatively long, and southern and southeastern provenances (high altitudes in the E. Alps and S. Tyrol, S. Poland, and the Ardennes, and Auvergne) relatively short branches. Preliminary conclusions drawn from this study are that for S. Sweden more southerly provenances and those from lower altitudes give the best results.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 1064–5, 1170, 1341–2, 1344–6, 1392.

1270. Rudnicki, J. Zależność wilgotności gleby od pory i sposobu jej przygotowania. [**Dependence of soil moisture content on season and method of soil cultivation.**] *Sylwan* 97 (4), 1953 (293–6). [Pol.]

Presents some results of tests in 1951–3 on the moisture content of forest soil. Measurements were made in April–May and July, the soil tested being either (*a*) unprepared, (*b*) a normal furrow, (*c*) a loosened furrow, (*d*) a hoed furrow or (*e*) continually loosened soil, the time of soil preparation being either (1) autumn or (2) spring. So far 630 determinations have been made. It appears that (*b*) does not increase the soil m.c., but (*c*) particularly (*c*) (1), greatly raises the m.c. compared with (*a*). Results for (*e*) are inconclusive, and so are differences found between arable land converted to forest, cleared forest soil, and forest soil under stands. The general conclusion is that soil preparation in spring does not, as a rule, adversely affect soil moisture conditions.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

1271. Querengässer, F. Pflanzschul-Erfahrungen mit *Tsuga heterophylla* und *Thuja plicata* in ihrer Heimat. [**Nursery practice with *Tsuga heterophylla* and *Thuja plicata* in their native country.**] *Forst u. Holz* 8 (17), 1953 (250–2). [G.]

Brief notes on seed extraction, treatment, and germinating properties, and on raising plants from seed.

1272. Holmes, G. D., and Buszewicz, G. **Forest tree seed investigations.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (12–4).

Examination of cone samples to ascertain the quantity and quality of the seed in them was continued. This service is found to be useful as it saves the collection of cones that contain too little seed to be worth having. Studies in the control of conditions in seed-extraction kilns and in seed-sampling methods have been begun. Further confirmatory work was done on the use of tetrazolium bromide for testing seed viability, and this method is now regularly used for supplementing standard tests. A mycological study of the fungi developing on seeds during germination, to determine which are harmful, has been begun. Seed-storage tests continued. It was found that low-temperature (10° F.) storage of Oak and Beech was lethal. Beech seed stratified in an unsealed container, and kept at 25° F. showed 50% germination after 18 months.

1273. Cooper, L. G., and Bramwell, A. G. **Notes on nursery and planting practice, Mamu River and Bende rehabilitation schemes, 1952/53.** *Inform. Bull. For. Dep. Nigeria* No. 13, 1953. pp. 3.

Gives notes on seed collection, preparation and pretreatment, numbers of fruits or seeds per gallon, germination, rate of nursery growth, transplanting and type of field plant recommended, for *Gmelina arborea*, *Chlorophora excelsa*. *Terminalia ivorensis*, *Khaya ivorensis*, *Canarium schweinfurthii*, *Afzelia africana*, *Pterocarpus soyauxii* and *Sarcocephalus diderrichii*.

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also No. 1177.

1274. Allen, R. M. **Release and fertilization stimulate Longleaf Pine cone crop.** *J. For.* 51 (11), 1953 (827). 4 refs.

Second-growth *Pinus palustris* trees were given one of four treatments: (1) release from all dominant, co-dominant and intermediate trees from a radius of 17–20 ft., (2) application of 5–15–5 fertilizer, (3) a combination of (1) and (2), and (4) untreated controls. No effect was observed until the 3rd and 4th years after treatment, when average annual cone production per tree was 6·9 for (1), 13·5 for (2), 16·7 for (3) and 1·3 for (4). [Cf. *For. Abstr.* 15 (No. 215).]

1275. **The induction of flowering in Monterey Pine [*Pinus radiata*].** *Rep. For. Timb. Bur. Aust. 1952*, 1953 (18).

Sharp increases in the number of cones were produced by strangulation and root pruning, in the year following treatment, but the effect did not last in the second year. Trees fertilized in 1951 with 5 lb. of superphosphate produced a comparatively heavy

crop of conelets in 1952 (54 on 20 trees compared with 26 on 20 untreated trees).

1276. LANGNER, W. Die Klonanordnung in Samenplantagen. [**The arrangement of clones in seed orchards.**] *Z. Forstgenet.* 2 (6), 1953 (119–21). 3 refs. [G.g.e.]

Complete randomization is advised. A suitable distribution of 10 clones with 10 plants in each clone can be obtained, using either a triangular or a square lay-out. In theory, however, the triangular lay-out has certain advantages. Proposals are made for suitable mixtures of various numbers of clones. *From author's summary.*

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also Nos. 1179–80, 1268, 1271–3.

1277. JOVANČEVIĆ, M. O težinskim i volumnim svojstvima semenja i plodova nekih mediteranskih vrsta. [**Weight and volume of seeds and fruits of some Mediterranean species.**] *Šum. List* 77 (4/5), 1953 (223–8). 10 refs. [Croat.f.]

Tabulates the numbers per litre and kg., and weight of 1 litre and of 1000 seeds and/or fruits of 29 species, mostly trees (including 8 conifers) and shrubs.

1278. PIŠKORIĆ, O. Utjecaj krupnoće sjemena plutnjaka i prnara na nicanje i razvoj biljaka. [**Effect of the size of *Quercus suber* and *Q. coccifera* seeds on germination and seedling development.**] *Šum. List* 77 (4/5), 1953 (169–71). [Croat.]

Trials have shown that the larger acorns of either species have higher and earlier germination. Seedlings from them are taller, though not significantly so.

232.315. Seed Storage and Treatment

See also Nos. 1271–3, 1291, 1546–8.

1279. BROERTJES, C. Zaadonderzoek. [**Seed research.**] *Jaarb. Ver. Proeft. Boskoop 1952* [1953] (31–2). [Du.]

Investigations showed that: (1) *Ilex aquifolium* seed is best collected when the fruit is light red in colour; germination % is much higher from seeds from which the flesh has been removed; peat dust is the best stratification medium and neither warm-water treatment nor refrigeration of seed affects the results for freshly collected seed, most seeds germinating in the second year; some seed from trade sources, however, germinated during the first year after warm-water treatment or refrigeration, although %s were low. (2) Trade seed of *Taxus baccata* obtained in 1951 and tested for the effect of various treatments in spring 1952, gave best results (51–54% germination) when soaked for 1–2 weeks in cold water.

1280. HOLMES, G. D. **Forest tree seed investigations.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (13–5).

Four years' work on seed pretreatment by soaking was concluded and indicated that for the species tested (Sitka and Norway Spruces, Japanese Larch and Scots Pine) soaking gave too little response to be worth while.

1281. BELTRAM, V. Močenje macesnovega semena pred setvijo. [**Steeping Larch seeds before sowing.**] *Gozd. Vestn.* 11 (6/7), 1953 (209–10). [Sloven.]

Larch seeds steeped for 14 days in cold water that was changed every other day, all germinated within 8 days in the germinator. The proportion should be 3 litres of water per litre of seeds. The soil should be moist at the time of sowing.

232.318. Seed Testing. Germination Tests. Seed Quality.

See also Nos. 1272–3.

1282. MAKSIĆ, S. Rezultati određivanja klijavosti nekih vrsta šumskog semena po brzoj metodi sa indigokarminom. [**Results of germination tests of some tree seeds, using the rapid indigo-carmine method.**] *Godišn. šum. nauč. opit. Inst., Skopje* No. 1, 1951 (203–9). 1 ref. [Serb.f.]

Comparative tests with 35 forest species have shown that the indigo-carmine-solution method gives higher results than the germinator method, is not suitable for very small seeds, requires skilled labour and is time-consuming. On the other hand, it can be recommended as a substitute when the germinator cannot be used or is not available. Advantages are that it requires little space, results are independent of temperature, and there is no danger of fungus infection.

232.32. *Plant Rearing. Nursery Practice*

See also Nos. 1271, 1273, 1333.

1283. BERG, H. Kontraktdyrking av skogplanter. [**Contract cultivation [by landowners] of seedlings.**] *Tidsskr. Skogbr.* 61 (10), 1953 (375–86). [Nor.]

In S. Sunnmøre, W. Norway, where the demand for plants from the local forest-society nursery far exceeds the space available, a scheme was started in 1951, whereby 2 + 0 Spruce plants were delivered to contractors, grown on by them for 1 or 2 years and delivered by them to buyers named by the nursery, which bound itself to buy back any surplus stock. The contractors eventually received the fixed selling price of the 2 + 1 and 2 + 2 plants minus the fixed selling price of the 2 + 0 plants and a 2% administration charge. A summary of expenses showed an estimated mean net profit to the contractor of Kr.2000/dekare planted for the 2-year period 1951–2, allowing for a 17% plant loss (in fact the loss of plants in contract cultivation ranged from 10 to 15%). Advantages of contract cultivation are: (1) the soil is in good heart, high-quality plants are obtained, and losses are small; and (2) the inclusion of nursery stock in the normal rotation of farm crops means that there is no need for special fertilizing, and that there are few weeds among the young plants. The size of the contractual undertaking must depend on the amount of labour available to the contractor but should not be too small because of the administrative costs; in 1953, units in Sunnmøre varied from 50,000 to 250,000 plants. Deliveries can best be made from the contractors in small batches throughout the season. The distribution of plants

of a provenance suitable for the area of the contractor and his customers can easily be controlled by the nursery. It would be advisable to establish a fund to cover unavoidable heavy losses. Careful selection of contractors and contract sites and close contact between nurseries and contractors are essential.

1284. ANDREUCCETTI, E. La cultura degli eucalipti nella Sicilia centrale. **[Eucalypt growing in central Sicily.]** *Monti e Boschi* 4 (10), 1953 (446–54). [It.f.e.]

Gives a detailed account of nursery practice, including transplanting into pots, watering, and root pruning; notes on species planted; and some data on increment of *Eucalyptus globulus* and *E. rostrata*.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 1292, 1617.

1285. MANARESI, A. La stanchezza del terreno nei vivai di piante legnose. **[Soil sickness in tree nurseries.]** *Ital. agric.* 90 (7), 1953 (477–92). [It.] E.M.B.

Reviews previous theories on the cause of soil sickness. Gives the results of a long series of observations in Italian tree nurseries, grouping species according to their susceptibility, and propounds the theory that the unfavourable conditions are due to toxic substances excreted by the roots of certain species. Detailed notes are given on some 30 species (mostly fruit trees) indicating the antipathies between certain species.

1286. MOLLISON, J. E. **Effect of partial sterilization and acidification of soil on the fungal population.** *Trans. Brit. mycol. Soc.* 36 (3), 1953 (215–28 + 1 plate). 16 refs. O.B.D.

Steaming reduced the numbers of fungi in old forest nursery soils at Ampthill, Beds., throughout the period tested. Fungi recolonizing steamed plots were varied. Formalin also reduced numbers, but the recolonizing forms were dominated by a species of *Trichoderma*. The numbers of fungi increased slightly after acid treatment. [Cf. *For. Abstr.* 14 (No. 2169).] *From author's summary.*

1287. HOLMES, G. D., and FAULKNER, R. **Experimental work in nurseries.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (15–27).

The restoration of fertility by partial sterilization of the soil [cf. *For. Abstr.* 14 (No. 2171)] was further investigated. Soil-steaming experiments were confined to investigating the best and cheapest techniques for steaming, the use of a hood being found the most practicable, steam being passed until the soil reaches 180° F. at a depth of 6 in. Attempts at improving the efficiency of partial sterilization with formalin by sealing the soil in various ways gave inconclusive results. It was found, however, that the amount of water used to dilute a given amount of formalin was important, and that less than 1 gal. of water/sq. yd. (containing 0·10 gal. commercial formalin) resulted in a smaller growth response by the seedlings. Soil acidification at Widehaugh nursery in Northumberland, carried out in 1950 by various methods, had no residual effect on the height growth of seedlings from 1951 sowings.

Trials were carried out with various straw and sawdust composts, using $(NH_4)_2SO_4$, formalized casein, and spent hops, as sources of N to activate the breakdown of the organic matter. On heathland and woodland soils, all composts gave improved growth of seedlings, though how much of this was due to the nitrogenous activators is not clear. Responses on older established nursery soils were insignificant. In some mulching experiments on heathland soil, comparing a bracken mulch with an inert cellulose mulch, the former gave an increase in growth, while the latter slightly depressed it, suggesting that the main effect of a bracken mulch is due to the nutrients leached out of it. A long-term fertility demonstration at Teindland heathland nursery in Morayshire, in which regimes of compost and fertilizer applications, separate and in combination, are compared with unmanured controls, was cropped for the second year and showed best results from fertilizers without compost. A similar demonstration, with the added factors of partial sterilization and green cropping, has been started at Newton Nursery near Elgin, an old established nursery on agricultural soil. Here, formalin treatment had the greatest single effect; fertilizers produced considerable benefit, but neither green crop nor compost treatments have so far had any effect on mean height as compared with controls.

An old green-cropping experiment at Kennington nursery (Oxford) showed no improvement in fertility on plots that had been under grass ley for several years, compared with those continuously cropped with Sitka Spruce. Plots that had lain fallow continuously did, however, show significantly greater total production of Sitka Spruce seedlings. At Wareham heathland nursery, incorporation of green crops had a depressing effect on seedling growth in the subsequent year.

Nursery irrigation by overhead spray line at Kennington nursery, to make up deficit of rainfall when it amounted to 0·5 in. below normal, increased Sitka Spruce seedling production from 49,000 per lb. of seed for controls to 89,000 for the irrigated plots; seedling mean height was simultaneously increased from 1·77 in. to 2·26 in. The number of usable first-year seedlings was doubled. Increases in seedling production were not quite so great for Corsican Pine and Japanese Larch; Douglas Fir showed no response.

Intensive culture of Sitka Spruce seedlings in frames with soil heating and specially compounded soils resulted in large, sturdy seedlings, 98–100% usable in the first year. The economics of such intensive methods have not yet been worked out.

1288. FAULKNER, R., and HOLMES, G. D. **Experimental work in nurseries: composting and trials of composting.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (20–1).

On heathland soils, composts made from sawdust or heather as base materials did not improve the growth of Sitka Spruce seedlings, but all straw composts considerably increased both growth and plant %. Slaughterhouse blood applied to beds in the previous autumn, at 4500 gal./acre, increased the growth of Sitka seedlings in the following season to

an extent about equal to that resulting from an application of 20 tons of bracken/blood or bracken/hops compost per acre. In composting straw, the addition of 15% by volume of succulent material such as grass mowings, along with the nitrogenous activator, greatly improved breakdown. Satisfactory straw composts can be prepared by using $(NH_4)_2SO_4$ or nitrochalk, provided that a moisture retainer is added and acid conditions prevented.

232.323. Sowing and Covering.

1289. Faulkner, R. **Notes on choosing a suitable conifer seedbed cover with some recent experimental results used for illustration.** *Scot. For.* 7 (4), 1953 (121–4). 4 refs.

Light-coloured, coarse, washed sands or fine angular gravels, which are lime-free, produce the greatest yield of seedlings when used as covering media for conifer seedbeds. Soil, or fine, dusty or silty sands, and media containing a proportion of small flat pebbles are not considered to be suitable. *Author's summary.*

1290. Zlatarić, B. Neke savremene metode razmnožavanja domaćih topola. **[Some modern methods of propagating indigenous Poplars.]** *Šum. List* 77 (6), 1953 (255–62). 2 refs. [Croat.e.]

Describes the methods of vegetative propagation of *Populus alba*, *P. tremula* and *P. canescens* at present used in Sweden and gives the results of the author's own experiments on propagating *P. nigra* by seed in Jugoslavia. It is recommended, when sowing seeds with their pappus on, to press them against the sand so as to enable the radicles to make immediate contact with the soil. Results of germination tests are tabulated; seed should be sown within 40 days from collection.

232.325. Tending (in both Seedbeds and Transplant Beds)

See No. 1287.

232.327. Protection Measures in Nurseries

See also Nos. 1184–5, 1493, 1617.

1291. Berbee, J. G., Berbee, F., and Brener, W. H. **The prevention of damping-off of coniferous seedlings by pelleting seed.** *Abstr.* in *Phytopathology* 43 (9), 1953 (466).

Twenty-eight fungicides were tested to prevent damping-off of coniferous seedlings by *Pythium irregulare* and *Rhizoctonia solani*. These diseases, particularly the latter, have continued to be severe on *Pinus resinosa* seedlings in Wisconsin. A single spring application of 75% tetramethylthiuram disulphide or of a 30% mixture of the Na salts of dimethyldithiocarbamic acid and 2-mercaptodenzothiazole sprayed on the soil at the respective rates of 0·5 and 4·0 g./sq. ft., controlled post-emergence *Rhizoctonia* damping-off, but pre-emergence loss occurred and both treatments attracted mice. Pelleting of seed with 50% tetramethylthiuram disulphide, using 4% methyl cellulose as a binder, was more effective than soil treatment. Concentrations of up to 4 lb. of fungicide to 1 lb. of seed caused no injury to autumn-sown seedbeds. Pellets prepared in a pharmaceutical pill-coater by mixing 3 oz. methyl cellulose, 8 oz. fungicide and 1 lb. seed, controlled both pre- and post-emergence infections. For spring seedlings, a mixture of 1 oz., 2 oz., and 1 lb. respectively provided adequate protection. [Cf. *For. Abstr.* 12 (No. 1436).]

1292. Cox, R. S. **Etiology and control of a serious complex of diseases of conifer seedlings.** *Abstr.* in *Phytopathology* 43 (9), 1953 (469).

A disease complex, consisting of damping off, root rot, stem canker and needle blight of conifer (particularly *Pinus strobus*) seedlings has long been a limiting factor in the State Forest Nursery, Lincoln, Del. The primary cause is *Cylindrocladium scoparium*. The following control programme has been found effective. For damping off and root rot, presowing soil treatments with commercial-grade formaldehyde (1–25 conc., 1 qt./sq. ft.) or chloropicrin (1 gal./1000 sq. ft.). For stem canker and needle blight, any of the following materials used with Triton B–1956 spreader-sticker and applied monthly from May to September inclusive: Bordeaux mixture (8–8–100), Manzate (1½–100), zineb (2–100), ferbam (2–100), or thiram (1½–100).

1293. Fonseca, J. P. da. Experiências de combate químico a cupins subterrâneos no horto florestal de Guaraní. **[Chemical control of subterranean termites in the Guaraní forest nursery.]** *Arquivos do Instituto Biológico, São Paulo* 19, 1949/50 (1950) (57–84 + 4 plates). 2 refs. [Port.e.] I.I.E.

A series of experiments was made in which 23 products were tested for the control of *Syntermes insidians*, *S. molestus* and other termites causing injury to *Eucalyptus* spp. Arsenic preparations proved to be the most effective. Soil treatment with As_2O_3 or Pb arsenate at concentrations of 3% is recommended.

232.328. Vegetative Propagation.

See also No. 1082.

1294. Jovanović, S. Upotreba fitohormona i stimulatora rasta u šumarstvu. **[The use of phytohormones and growth stimulants in forestry.]** *Šumarstvo* 6 (3), 1953 (209–23). 36 refs. [Serb.e.g.]

A survey of experimental work on the use of phytohormones in propagating trees and plants by cuttings. The 36 references include a few Jugoslav ones.

1295. Hough, W. S. **Effects of parental age, location on the tree, and age on rooting of Douglas-Fir cuttings.** *Res. Note U.B.C. For. Club* No. 9, 1953. pp. 4. 2 refs.

The effect of parental age was tested by using two groups of 1600 cuttings each, (1) taken from 82- and (2) from 16-year-old Douglas Fir trees. Half the cuttings (*a*) of each group were taken from shaded parts of the tree and half (*b*) from exposed parts. Each age and shade group was represented by 200 cuttings with each of the following characteristics: 1-year-old wood with no basal bud; 2-year-old wood with a basal bud; 3-year-old wood with a basal bud. The cuttings were trimmed and soaked for 24 hours, half of them in water and the other half in a solution of indolebutyric acid. This resulted in 32 lots of

100 cuttings each; half of each lot was dipped in fungicide before planting. After 9 weeks all (2) (*b*) cuttings were attacked by *Adelges cooleyi* and in spite of spraying most of them died. Most of the (2) cuttings had terminal buds which made new growth, and this may well have had an adverse effect on rooting. Cuttings not treated with fungicide produced so few roots (7% rooted) that they were not included in the calculations. The use of indolebutyric acid gave a highly significant increase in rooting—123% in (1) and 77% in (2). In general the best rooting was obtained from the youngest wood and from the younger trees. There was, however, a highly significant exception to this; the best class of material tested was 1-year-old wood with no basal bud, cut from (1) (*a*).

1296. MATTHEWS, J. D. **Forest genetics: *Cupressocyparis leylandii* and *Metasequoia glyptostroboides*.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (81–2).

Preliminary results of experiments in propagation by cuttings.

1297. MAISENHELDER, L. C. **Rooting Ash cuttings with hormones.** *Sth. For. Notes Sth. For. Exp. Sta.* No. 87, 1953 (2–3).

In a small greenhouse test, Ash [*Fraxinus pennsylvanica* var. *lanceolata*] cuttings were soaked for 24 hr. in water solutions of naphthalene-acetic, indole-acetic or indolebutyric acids, each at concentrations of 20, 60 and 100 p.p.m., and then set in pots. At the end of 10 weeks 47% of the treated cuttings had rooted and developed normal foliage as compared with 20% of the controls. All 3 acids appeared to be equally effective. There were slight but not definite indications that 60 p.p.m. was the best concentration. Sweetgum cuttings included in the test completely failed to root and a smaller % of Cottonwood controls rooted than is usual in field plantings, so results for these species cannot be considered satisfactory.

1298. SEKAWIN, M. Confronto fra un vivaio di pioppo impiantato con talee e uno impiantato con barbatelle. [**Comparison of a nursery planted directly with cuttings and one planted with cut-back rooted cuttings.**] In *Studi e Ricerche sulla Pioppicoltura*, Ente nazionale per la Cellulosa e per la Carta, Rome. 1953. pp. 21–7. [It.]

It was found that by planting Poplar cuttings in a temporary nursery, lifting them at the end of the year, and cutting back before planting out in the nursery beds, plants of better form were obtained and establishment was 88·6% compared with 56·1% for cuttings planted directly in the nursery.

1299. Essai de plantation de bambous. [**Trial planting of Bamboos.**] *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (116). [F.]

Experiments were made in the propagation of Bamboos by stem cuttings. After one month in the ground the number of nodes that showed shoots was 267 out of 1196 *Bambusa striata* planted, 28 out of 803 *B. metake*, 7 out of 18 *B. spinosa*, and none out of 25 *B. japonica*.

1300. DAVID, R. Un nouveau procédé de multiplication végétative du pin maritime. [**A new method of vegetative propagation of *Pinus pinaster*.**] *C.R. Acad. Sci., Paris* 237 (19), 1953 (1175–8). 2 refs. [F.f.] O.R.S.

[Cf. *For. Abstr.* 11 (No. 870).] A ring of bark was removed from branches on the tree, the area above the wound was covered with a lanolin paste containing indolylacetic acid (0·3–3%), the wound was covered with moss (e.g. *S phagnum*) kept moistened, and the whole was covered with a fairly impermeable material, e.g. nylon, to reduce evaporation. 1–10 roots, 2–6 mm. thick, were formed. When they were 5–6 cm. long, the branch was severed at the point of the wound and potted up in a sand/compost mixture. Roots appeared after about 3 months from treatments in March–April, but more slowly from those in May–July. Most of these already rooted cuttings survived.

1301. MERGEN, F. **Air-layering as a possible method to reproduce selected Slash Pine.** *Naval Stores Rev.* 63 (21), 1953 (19–20).

Rooting of branches of *Pinus caribaea* was induced by removing a ¼-inch-wide ring of bark and cambium and dusting indole-butyric acid mixed with talcum powder on to the upper part of the girdle. Moist sphagnum moss was wrapped round the treated part and covered with a sheet of moisture-proof plastic. When the roots begin to develop they are visible through the plastic and when they are fully developed, the branch is cut off just below the girdle and potted in loose soil [cf. *For. Abstr.* 13 (No. 2950)]. Success was obtained with twigs prepared in both May and October.

1302. TEUSCHER, H. **Using plastic in outdoor grafting of conifers.** *Amer. Nurserym.* 98 (8), 1953 (13, 81).

The new polyethylene plastics, which are moisture-proof but allow O and CO_2 to pass through, have been found of great value in air-layering of plants [cf. *For. Abstr.* 13 (No. 2950)]. Experiments at the Montreal Botanical Garden have shown another promising use of them in approach-grafting on potted stock, carried on out of doors. The usual practice—sinking the pots containing the stock plants in the ground round the mother plant, so that only the lower branches are within reach, does not usually provide the most desirable scions. This difficulty can be overcome by wrapping the well-watered pot containing the stock plant first in wet sphagnum moss and then in polyethylene plastic, sealing the latter with tape on top. The stock plants thus prepared may be placed on quickly erected temporary scaffolds all round the mother plant to any desired height, and the upper branches thus brought into easy reach can be used for approach grafting. Because of its moss and plastic wrapping, the soil in the pot remains moist throughout the 4 weeks required for safe callus formation.

1303. MATTHEWS, J. D. **Forest genetics: propagation by grafting.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (68–70 + 2 photos).

A promising technique has been worked out for grafting Corsican Pine on rootstocks of Scots Pine, *Pinus contorta* and *P. mugo*, over 75% of the grafts under glass being successful. The testing of a method using veneer side grafts for mass production

in the open has been begun at Alice Holt. Best results were obtained on *P. contorta* stocks. Reduction of foliage on the scion and treatment of the remaining foliage and the graft union with low-melting-point paraffin wax gave improved results.

1304. VOGEL, P. DE. Proeven over het enten van blauwe sparren. [**Experiments in grafting *Picea pungens* var. *glauca***.] *Jaarb. Ver. Proeft. Boskoop 1952* [1953] (20–2). [Du.du.]

As in earlier experiments [cf. *For. Abstr.* 14 (No. 304)] scions from transplants gave better results than those from untransplanted stock and results were better on stocks cut back in November of the previous year than on those cut back only a few days before grafting; but, unlike the earlier results, there was no difference in the % of successful grafts with the date of grafting from 6 Aug. to 8 Sept. although callus formation was less strong after 28 Aug.

1305. WELLS, J. S. **Propagating Koster Spruce.** *Amer. Nurserym.* 98 (9), 1953 (13, 48–53).

Describes methods of propagating this ornamental variety of *Picea pungens* by grafting on to potted seedlings. *P. abies* is found to be superior to *P. pungens* for the stock.

1306. VREELING, L. H., VOGEL, P. DE, and RAVENSBERG, K. Proeven met kunstmatige belichting bij het stekken en zetten: belichting bij het zetten van berken. [**Experiments with artificial lighting in propagating by cuttings and in grafting: artificial lighting in grafting Birch.**] *Jaarb. Ver. Proeft. Boskoop 1952* [1953] (29–30). [Du.]

[Cf. *For. Abstr.* 14 (No. 301).] Further inspections made on 8 May and 7 Nov. 1952 showed that all light strengths gave results poorer than or equal to those from grafts given no artificial lighting. *B. pubescens* as stock gave stronger callus formation, a higher % of successful grafts and better growth than *B. verrucosa*.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes, etc.)

See Nos. 1287, 1319, 1392.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 1336–7, 1470, 1546–8.

1307. ZACHAR, D. Používanie krycích kultúr pri zakladaní lesných porastov. [**Use of cover crops in forming forest plantations.**] *Za social. Zeměd.* 3 (7/8), 1953 (868–77). [Slovak.] C.G.B.

After a discussion of results obtained by Soviet authors, the trials made since 1952 at an experimental station at Strnady (south of Prague) are described. On 30 plots of 5 × 10 m. each, (*a*) *Quercus cerris*, (*b*) *Acer platanoides*, (*c*) *A. pseudoplatanus*, (*d*) *A. negundo*, and (*e*) *Fraxinus excelsior*, were sown pure at 450 seeds/plot, with 6 plots per species of which (1) was left unweeded, (2) was weeded, and the others broadcast with (3) *Hordeum sativum*, (4) *Triticum vulgare*, (5) *Avena sativa*, and (6) *Secale multicaule*. It was found that (3) caused worse temperature conditions (a greater amplitude) than (1) and (2); the greatest evaporation was in (1), the least in (6) at a height of 5 cm., and in (3) at 50 cm.; seedlings of (*a*) attained a greater height but a smaller diameter under cover crops (i.e. (3)–(6)) than without them, and (5) gave particularly poor results in all respects (germination, height, diameter, number of leaves). Trials with (*b*)–(*e*) confirmed the above results for seedling height; seedlings of (*a*) were better in all respects when sown densely (50 in a circle of 60 cm. diam. versus 25).

1308. **Seeding and planting under Mountain Eucalypt Forest.** *Rep. For. Timb. Bur. Aust. 1952*, 1953 (18).

In the Mountain Eucalypt forests of the Australian Capital Territory it was found that broadcast *Pinus radiata* seed germinated when placed (*a*) on bare earth, (*b*) on grass in Eucalypt litter, and (*c*) under *Daviesia* scrub, but the only seedlings that survived 16 months after sowing were (*a*) and (*b*). Highest survival resulted from (*b*) with protection from animals, a plant % of 5 being obtained from the seed. Spot sowing gave a germination of ca. 47% and plant % of ca. 34 at 16 months. The main cause of seedling mortality appeared to be drought. Seedlings were only 3 in. high at 16 months.

Planting also was carried out in the same conditions, seedlings being planted (1) in prepared holes and (2) in slits. After 16 months all seedlings in (1) were alive but they had grown only ca. 3 in. in height; only ca. 60% of (2) survived.

232.4. Formation of Stands by Planting

232.41. *Planting Stock* (*Type, Handling and Treatment*)

See also Nos. 1273, 1470.

1309. TORTORELLI, E., and MUÑOZ, D. Técnica defectuosa como causa de pérdidas en las plantaciones de *Pinus insignis* en Chile. [**Defective technique as a cause of losses in *P. radiata* plantations in Chile.**] *Montes, Madrid* 9 (52), 1953 (297–304). [Span.]

An investigation by the Chilean Forest Department permitted the following conclusions. In the central zone, planting is best done between 15 April and 1 Aug., choosing suitable weather; in the south, spring planting is more likely to succeed. Exposure of roots when transplanting is an important cause of losses. Little harm is done, however, by injury to root tips or by heeling-in over night. Notch planting gives good results, but any doubling-up of the roots is fatal in the dry season. Planting with the collar above ground level is definitely harmful, especially under dry conditions; but putting it deeper than ground level in dry sandy soils may be beneficial. It is important to plant at collar level in clay or very moist soils. Ploughing before planting is necessary in northern and central districts. In dry regions the shoot of the plant should be ca. 15 cm. long, and the collar diameter 3–4 mm. This ensures that the plant is sufficiently developed to resist extreme ground temperatures.

1310. LIMSTROM, G. A., FINN, R. F., and DEITSCHMAN, G. H. **How to grade Yellow Poplar [*Liriodendron tulipifera*] planting stock.** *Sta. Note Cent. St. For. Exp. Sta.* No. 81, 1953. pp. 2.

On the basis of analyses of seedling survival on 75 field plots of 25 seedlings each in plantings on old

fields and surface-mined lands, recommendations are made for min. and max. stem diameters ($\frac{5}{20}$ and $\frac{7}{20}$ in. respectively at the collar for dry exposed sites and $\frac{4}{20}$ and $\frac{8}{20}$ for moist protected sites) for planting stock in the Central States. The same field tests showed that, to reduce packing, transport and planting costs, the tops of seedlings could be pruned to a min. length of 5 in. without affecting field survival or initial growth.

1311. Jobling, J. **Establishment of Poplars.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (72–5).

An experiment was designed to show what type of planting stock produces the best Poplar plantations. The types tried were: (1) 1-year rooted cuttings, (2) stumped 1-year cuttings lined out in the nursery for one year, (3) stumped 1-year cuttings lined out for 2 years, and (4) unrooted setts, using *Populus serotina* (both ordinary and narrow-crowned varieties), *P. gelrica* and *P. robusta*. Trials were made on 3 different site types. The different treatments produced virtually the same results on all sites. *P. serotina* narrow-crowned variety and *P. gelrica* survived better on all sites than the other two.

Of the types of planting stock tested, (2) gave best survival and height growth; (4) generally the poorest survival; (1) gave better survival and height growth than either (3) or (4); (3)—a large and expensive type of plant to produce—were not significantly more successful in the field than (4), which are relatively cheap.

In manurial experiments, applications of N produced the greatest effect; responses were also obtained to K.

1312. **Nurseryman develops balling machine.** *Amer. Nurserym.* 98 (8), 1953 (14).

Describes a lifting machine for attachment to the hydraulic lift of a 3-plough tractor, which raises coniferous planting stock with a ball of earth round the roots. The machine, operated by 3 men, does the work of 20 men in an 8-hr. day, will dig 3 trees in 2 minutes, and can be installed on a tractor in 15 minutes. It is the invention of J. C. Slatton, of Slatton Nursery and Implement Co., McMinnville, Tenn.

232.42. *Methods of Planting (including Use of Fertilizers etc.)*

See also Nos. 1175, 1309, 1311.

1313. Robertson, A. F. **[Planting technique for Eucalypts in Hong Kong.]** *Rep. Dir. Agric. Fish. For. Hong Kong 1952/53*, 1953 (70).

Preliminary research indicates that a relatively expensive technique—pit-planting of tubed stock with immediate application of $(NH_4)_2\ SO_4$—is likely to prove more economical in the long run than cheaper methods, as the consequent rapid early growth reduces or eliminates tending operations.

1314. Šlander, J. Saditev smrekovih sadik in rdeča gniloba. **[Planting of Norway Spruce and 'red rot' [*Fomes annosus*].]** *Gozd. Vestn.* 11 (6/7), 1953 (178–84). 3 refs. [Sloven.]

Increased incidence of *F. annosus* in Spruce plantations is due to wrong planting technique, in which the roots of the plant are inserted vertically into a narrow tapering hole. Since Spruce, unlike Pine, has a shallow spreading root system, it is recommended that Spruce be planted in relatively shallow, wide holes, preferably with a convex bottom.

1315. Zehetmayr, J. W. L. **Position of planting on ploughed heathland.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (33–8).

In planting on ploughed heathland, experiments have repeatedly shown that planting on top of the ridge of soil turned out by the plough is one of the worst positions as regards survival and subsequent growth. The bottom of the furrow is a good position, but planting on the side of the furrow is best. This does not apply to planting on ploughed, deep wet peat, where the furrows serve to drain the soil.

1316. Królikowski, L. Badania pracy kostura w zależności od jego kształtu. **[Investigations on the work of notching tools in relation to their shape.]** *Prace Inst. Bad. Leśn.* No. 91, 1953. pp. 60. 43 refs. [Pol.russ.e.]

Presents the results of tests made before the war with a number of different tools used for planting Pine. Nineteen types of tool were tested on different soils. The final tests were conducted with tools of 3 different shapes and different finish. The investigation has resulted in the development of 3 standard dibbles which have since been used in Polish forestry; they are suitable for sandy, loamy, and stony soils, respectively.

1317. Burckhardt. Erfahrungen mit der Pflanzmaschine 'Robot' im Forstbezirk Karlsruhe-Hardt. **[Experience with the 'Robot' planting machine in the Karlsruhe-Hardt forest district.]** *Forst u. Holz* 8 (20), 1953 (293–6). [G.]

The planting machine, made by Paul Treckmann Egelsbach, was used with success on cleared and ploughed land from 1950 to 1953. Details of operations and costs are presented. Over the 4 years, cost of planting 1000 trees averaged DM.5·50.

232.43. *Spacing and Arrangement in Plantations*

See also Nos. 1247, 1352.

1318. Schmith, T. B. ¿Cuántos pinos debemos plantar por hectárea? **[How many Pines per hectare should we plant?]** *Chile Maderero* 3 (6), 1953 (7). [Span.]

From the commercial point of view, and so long as prices for small timber remain stable, it is advantageous to reduce the spacing of *Pinus radiata* from 2 × 2 m. to 1·5 × 1·5 m. in order to obtain small timber for pulpwood. With this spacing, 2000 trees/ha. may be removed between the ages of 8 and 14 years. This should be done in two stages with an interval of 3 years. Silviculturally no harm arises so long as the whole stand rotation is not shortened.

1319. Expérimentation forestière entreprise en 1952. 1. Application de la méthode d'Anderson. **[Projects undertaken in 1952. 1. Application to local conditions of Anderson's method [of group planting].]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (126–8). [F.]

Preliminary report on an experiment in the use of group planting (1) to establish mixed mountain forest of indigenous and exotic species, (2) to convert Eucalypt plantations into mixed stands by underplanting with shade-bearing rain-forest species. Planting stock was raised in banana-leaf baskets. The method is based on Scottish experiments [cf. *For. Abstr.* 13 (No. 2091).]

233. *Afforestation*

See also Nos. 1170–2, 1175, 1254, 1315, 1336, 1375–6, 1461.

1320. NIMMO, M. **The 1945 Broom and Pine nursing experiments at Coldharbour, Wareham Forest, Dorset.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (31–3 + 2 photos).

Experimental plantings of Sitka Spruce, Norway Spruce, Douglas Fir and *Tsuga heterophylla* were made in 1945 on this difficult *Calluna* heathland. Five different treatments were given: (A) pure plots of the nursed species; (B) 2 row/2 row mixtures of the nursed species and Scots Pine; (C) as (B) but with Corsican Pine; (D) as (B) but with Broom [*Cytisus scoparius*] sowings on prepared patches between both Pines and nursed species; (E) nursed species intersown with Broom patches. All the plants and the Broom sowings each received an application of phosphate consisting of 2 oz. of bone-meal, with the exception of some control furrows along alternate edges of the plots. Ground variation prevented proper statistical analysis of the experiments, but the differences between growth in the controls and in the phosphate and Broom plots are such as to be beyond doubt. From the figures (tabulated) it is clear that, given a successful Broom crop, all the 4 species tried can be established by this method, whereas with phosphate alone the plants quickly go into check after the first 3 years. The mean height in inches at 7 years (6 for *Tsuga*) in plots with Broom and phosphate (when Broom is vigorous) is given below for the 4 nursed species (figures in brackets are for controls): Sitka Spruce 70·6 (19·7); Norway Spruce 55·5 (12·3); *Tsuga* 53·0 (19·0); Douglas Fir 96·7 (28·0).

Treatments (B) and (C) at present show poor results, but as the Pine gains control of the surface vegetation, the nursed species are expected to pick up rapidly. Under treatment (D) the Pines benefit from the Broom at the expense of the nursed species except in the case of Sitka Spruce. There are indications that the various species react differently when the variety of Pine is changed from Scots to Corsican. The causes for failure of Broom sowings in some sections are being investigated. [Cf. *For. Abstr.* 12 (No. 1101).]

1321. LEYTON, L. **Growth and nutrition in heathland plantations.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (117–9).

Investigations into the growth and mineral nutrition of Sitka Spruce and Scots and Corsican Pine in young heathland plantations have revealed significant changes due to the removal of the heather (screefing) and the application, at various levels, of ground mineral phosphate. Screefing in 1949 resulted in significant increases in dry matter and N content of the Spruce needles in 1950, and a corresponding increase in height growth of the trees in 1951. The application of phosphate also resulted in improved growth, but its effect appears to be indirect and associated with the N nutrition of the trees rather than with the improved phosphate status of the needles. The Pine also responded to screefing and phosphatic fertilizing but in a less marked degree. [Cf. *For. Abstr.* 15 (No. 1171).]

1322. PINCHIN, R. D. **Survey of plantations on opencast ironstone mining areas in the Midlands.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (51–4).

A detailed survey and assessment of plantations on old opencast mining areas in the Midlands has been made. In general, Larch, particularly hybrid Larch, and Sycamore Maple have been the most successful species on most sites. Spruce, Douglas Fir, Oak, Ash and Elm were unsuccessful. Scots and Corsican Pine have done fairly well.

1323. VINEY, R. Quelques techniques de reboisement de nos grands anciens. **[Some of the afforestation techniques of our ancestors.]** *Rev. for. franç.* 5 (10), 1953 (641–9 + 2 plates). [F.]

Notes on some techniques used in France in the 19th century, based on a good supply of cheap labour and especially involving thorough soil cultivation.

1324. PARENTE, E. L'attività di rimboschimento nella provincia di Grosseto. **[Afforestation in the Province of Grosseto [Tuscany].]** *Monti e Boschi* 4 (9), 1953 (396–403). [It.f.e.]

1325. MOLINA RODRIGUEZ, J. J. Repoblación de *P. silvestris* en los páramos de León y Palencia. **[Afforestation with *Pinus sylvestris* in the *páramos* of León and Palencia.]** *Montes, Madrid* 9 (52), 1953 (339–46). [Span.]

The 150-km. strip of highland running between the southernmost spurs of the Cantabrian Mts. and the Tierra de Campas consists of poor sandy soil supporting mainly *Erica* and *Calluna* associations with some *Quercus toza*. These highlands ('*páramos*') are mainly given over to grazing. Their afforestation with *P. sylvestris* is described. Details are presented of ploughing, planting, and tending operations, with some data on returns from the cleared vegetation which was used for charcoal.

1326. CHAPMAN, G. W.; DAVIDSON, D. F. **Afforestation techniques in Cyprus. 1. Afforestation in the mountains. 2. Afforestation techniques in the lowlands. 3. Afforestation of sand drift areas.** Forest Department, Nicosia, Cyprus. 1952. pp. 15 + 15 photos. Limited distribution: a paper prepared for the 3rd session of the Mediterranean Subcommission of the European Commission on Forestry and Forest Products held at Istanbul in May 1952.

1327. Essais de recolonisation forestière en savane. **[Experiments in the reforestation of savanna.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (124). [F.]

Further experiments in this project [cf. *For. Abstr.* 14 (No. 1189)] showed that the following savanna species are best regenerated by sowing:

Sweetia brachystachya, Flemingia rhodocarpa, Bixa orellana, Entada abyssinica, Alchornea cordifolia, Mangifera indica (only on good soil), *Bauhinia tomentosa, Millettia versicolor* and *Eugenia jambosa.* Cuttings were found to be successful for propagating *Ficus sanda, Millettia versicolor* and *Spondias mombin.*

1328. Baker, R. St. B. **The recovery of the Sahara.** *Trees, London* 17 (2), 1953 (63–8 + 3 photos).

Discusses the possibility of containing the Sahara desert by afforestation of its fringes and planting in oases.

1329. **Proceedings of the symposium on the Rajputana desert.** *Bulletin of the National Institute of Sciences of India, New Delhi* No. 1, 1952. pp. v + 302 + 2 plates. Many refs. Price *Rs.*13.2.

Includes a number of papers distributed in the following sections: (1) evolution of the desert, (2) geology and mineral resources, (3) topographical survey of the desert region and its possible extension, (4) meteorology and hydrology, (5) animal and plant ecology, (6) soils and agriculture, and (7) afforestation, reclamation and control.

1330. Miguet, J.-M.; Auroyer, A. Une expérience de reboisement en zone tropicale aride: la forêt de l'Étang-Salé à La Réunion. [**An experiment in afforestation in a tropical arid zone: the forest of l'Étang-Salé in the island of Réunion.**] *Rev. for. franç.* 5 (10), 1953 (674–86 + 2 plates). [F.]

The so-called 'forest' of l'Étang-Salé represents part of the former Pas-Géométrique surrounding the island, and consists mainly of light basaltic sands part of which are periodically waterlogged with stagnant brackish water. Rainfall is low and there is much wind. It has been regarded as virtually impossible to afforest, but the operations described have successfully established plantations on 150 ha. as well as reconstituting 250 ha. of devastated forest. The nursery practice, soil preparation, planting methods etc. are described in detail. In the past *Casuarina equisetifolia* was used almost exclusively, but its susceptibility to fire and to *Cerambyx* attacks, its lack of litter and incapacity to shade or improve the soil, have led to the adoption of other species in mixture with it: the approximate proportions used are *Casuarina* 40%, *Albizzia lebbek* 20%, *Inga dulcis* 20%, *Melia azedarach* 10%, and other species 10%.

1331. Brown, D. M. **Conifer transplants to a grassy bald on Roan Mountain.** *Ecology* 34 (3), 1953 (614–7). 5 refs.

Experiments in planting out Balsam Fir and Spruce [unspecified] on one of the grassy summits of the S. Appalachians, indicate that with protection from grazing and winds they can establish themselves.

234. *Formation of Forest by Natural Succession*

1332. Tryon, E. H., and Markus, R. **Development of vegetation on century-old iron-ore spoil banks.** *Bull. W. Va. agric. Exp. Sta.* No. 360, 1953. pp. 63. 21 refs.

The natural development of vegetation on iron-ore spoil banks varying in age from 72 to 131 years was studied, to determine their ability to support stands of trees or grasses. The results of investigations on forested areas showed no significant difference between spoil banks and natural woodland in abundance of woody vegetation, basal area, abundance of reproduction, abundance and composition of ground vegetation, and site quality. Yellowpoplar [*Liriodendron tulipifera*], Red Maple and Black Cherry all showed rapid current growth rate; growth rate of Oaks was slower but still adequate. Analysis of stumps of Chestnuts that had originated as seedlings soon after the spoils were formed, indicated that their growth had been satisfactory throughout their life. Root development on spoil and on controls was compared. A greater number of roots was found in the spoil, especially at a greater depth.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 1258, 1267, 1308, 1319–20, 1342–6.

1333. Radulović, S. Lipe i njihov značaj za obnovu šuma kod nas. [**Lime trees and their significance for forest regeneration in Serbia.**] *Šumarstvo* 6 (2), 1953 (108–16). 8 refs. [Serb.e.g.]

Stresses the importance of using Lime, in particular *Tilia argentea*, which in Serbia forms natural forest stands, in mixture with various *Quercus* species and with *Fraxinus ornus.* Directions for raising Lime in the nursery are given.

1334. Masson, J. Nos chênes indigènes: leur culture. [**The silviculture of our native Oaks.**] *Bull. Soc. for. Belg.* 60 (8/9), 1953 (403–9). [F.]

Suggests suitable mixtures for Oak in Belgium (Robinia, Hornbeam, Beech, Hazel and Alder) to act as soil improvers.

1335. Wood, R. F., and Nimmo, M. **Oak and Larch mixtures at the early pole stage.** *Rep. For. Res. For. Comm., Lond. 1950/51,* 1952 (46–51 + 1 photo).

A summary is given of experience with Oak/Larch mixtures raised experimentally in 5 different forests which have reached pole stage. On the whole, for ease of management, strip mixtures appear to be preferable to group mixtures. It is evident that wider spacings in Oak (up to 4 × 4 ft.) could be utilized and it seems probable that the number of plants in groups could be reduced to about 12. Relative rates of growth of Oak and Larch vary on different sites, but Larch is so much faster that the space between it and the nearest Oak should clearly not be less than 5 ft. There is an indication of a slight nursing effect by Larch on the Oak.

1336. Ilić, R. Ogledi pošumljavanja setvom semena crnog bora pod zaštitom smreke u NR Makedoniji. [**Afforestation trials by sowing *Pinus nigra* under *Juniperus communis* and *J. oxycedrus* in Macedonia.**] *Šumarstvo* 6 (4), 1953 (331–7). [Serb.e.g.]

Experimental sowings of *P. nigra* under Juniper scrub at 650–1000 m. and in different soils, gave

encouraging results, despite rather unfavourable climatic and soil conditions.

1337. Enrichissement en forêt. [**'Enrichment' in tropical forest.**] *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (132–3).

Experiments were made in patch-sowing of *Khaya anthotheca* and group planting of *Sarcocephalus diderrichii* for the enrichment of natural forest. The *Khaya* was sown in in December on hoed patches of 25 sq. m., in lines 60 cm. apart. Cleaning was done in July. By September plants averaged 87 per patch and 16·3 cm. high. In order to determine the effect of degree of illumination, thinnings were carried out on one out of every two plots. Sowings were made with freshly gathered seed, and with seed gathered 15 days, 1 month, and 2 months previously, which gave plant %s of 36, 37, 23, and 13 respectively. Plant % for surface sowings was 29 compared with 17 for sowings covered to a depth of 3 and 6 cm. *S. diderrichii* was planted in groups of 9 (in leaf baskets); 8 months after planting, mean height was 60·2 cm. Planting in April was much more successful than in August; in the latter case plants were insufficiently established when the rains came, and many were washed out.

1338. Aubréville, A. L'expérience de l'enrichissement par layons en Côte d'Ivoire. [**The experiment in forest enrichment by strip planting in the Ivory Coast.**] *Bois For. Trop.* No. 29, 1953 (3–9). [F.e.span.]

Enumerations carried out in two experimental plots established in 1931 confirmed the results obtained from an enumeration in 1946 [cf. *For. Abstr.* 9 (No. 2161)]. Data on survival and growth are tabulated. It is concluded that 50 trees/ha. of *Khaya ivorensis* or *Tarrietia utilis* can easily be established in this way.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)*

See also Nos. 1175, 1321, 1626.

1339. Grant, J. A. C. **The relationship between stocking and size of quadrat.** *Univ. Toronto For. Bull.* No. 1, 1951. pp. 35. 8 refs.

Recent regeneration surveys in Ontario have been carried out by the stocked-quadrat method, two sizes of quadrat being currently in use: $\frac{1}{600}$ of an acre and $\frac{1}{1000}$ of an acre. Stocking figures based on quadrats of different sizes are not directly comparable and in the course of reviewing the reports of a number of regeneration surveys [cf. next abstract] the author found it necessary to develop a formula for converting a stocking figure based upon one size of quadrat to the figure that might be expected if a different size had been used. The formula is $y = 1 - (1 - x)^r$ where x is the stocking observed, using a quadrat size of p units (expressed as a decimal fraction of unity), y is the stocking that would have been obtained if a quadrat size of q units had been used, and $r = q/p$ is the ratio of the size of quadrat required to that actually used. The stocking is expressed as a decimal fraction of unity, instead of a %, in order to simplify the formula and the calculations referred to it. The primary purpose of this bulletin is to deal with the basis for these conversions and the problems that arise in their application, and hence to form some idea of their reliability. To this end, the conversion formula is derived and several numerical examples with checks are given to illustrate the precision of the process. It is pointed out that the precision will, in general, be improved by stratification of the population, and the application of the formula to each stratum, the final figure being the weighted average of the separate converted figures. Finally quadrat size is discussed with particular reference to the practicability of using so small a size of field quadrat that it can be marked off by a portable frame.

1340. Hosie, R. C. **Forest regeneration in Ontario based on a review of surveys conducted in the province during the period 1918–1951.** *Univ. Toronto For. Bull.* No. 2, 1953. pp. xiv + 134 + 21 photos + map. Price $3·50.

The first 34 pages of this bulletin consists of (*a*) a general discussion of the probable nature and extent of forest regeneration in the Province, and (*b*) an analysis of procedure in carrying out and reporting regeneration surveys, with recommendations for standard procedure. The second part (100 pages) presents abstracts of 12 reports on regeneration made by various government and industrial agencies in the province between 1919 and 1951.

From the evidence of the reports that have been received, it is concluded that there is a considerable area of cut-over forest land, particularly better-quality sites, that is not reproducing satisfactorily as to either species or quantity, and the need for research on the ecology and artificial regeneration of valuable species is stressed. Certain matters connected with the procedure in carrying out forest-regeneration surveys require classification; they include stocking standards, size and distribution of quadrats, tallying, kinds of regeneration (advance growth, seedlings since disturbance, layerings) and forest types.

237. *Amelioration of Forest Sites*

See also Nos. 1047, 1170–1, 1211, 1321, 2119, 2175.

1341. Mikola, P. Eräitä maabiologisia näkökohtia metsänhoidossa. [**Some aspects of soil biology in silviculture.**] *Metsät. Aikak.* 1953 (8), (258–62). 5 refs. [Fi.e.]

Methods of preventing the formation of raw humus or of changing it to mull are discussed. These include: liming and mechanical cultivation, successfully practised in Germany; growing tree species with a deep root system and high base content in the leaves; and burning slash and the upper part of the raw-humus layer, as has been common practice in Sweden and Finland. *From author's summary.*

1342. Thielmann, K. Waldbodenmelioration (Erkenntnisse und Erfahrungen aus der Wiederaufforstung geringer Kiefernstandorte in der Oberpfalz). [**Towards forest soil improvement. (Diagnoses and experiences from the reforestation of inferior Pine**

sites in the Upper Palatinate).] *Mitt. StForstverw. Bayerns* No. 26, 1951 (67–124). 28 refs. [G.g.]

A summary based on 20 years' experience in the restoration of soils carrying stunted Pine, leading to recommendations similar to those for Middle Franconia [cf. *For. Abstr.* 15 (No. 1345)]. A series of soil-profile diagrams shows where heavy disking, ploughing, high-ridging and subsoiling are needed, and types of implements with their working widths and depths are illustrated. Tractors of 60–80 h.p. are recommended. $CaCO_3$, marl, and CaO are applied according to the consistence of the soil, the dosage being calculated on H. Walter's table which requires the following amounts of CaO in kg./ha. to raise the pH by one — sands 500, loams 1500, heavy loams 3000, soils with > 15% humus 4000–8000. Normally 2000–3500 kg. CaO/ha. are applied. A detailed table shows the preliminary costs (soil amelioration) at ca. DM.200/ha, which is raised to nearly DM.800 with planting and sowing completed. This latter includes the direct sowing of 10 kg. of lupin and 20 of Birch, the planting of 500 Larch, 1000 each of Alder, Willow and Spruce, 2000 each of Oak and Lime, 5000 *Pinus strobus* and 10,000 *P. sylvestris*. Growth on areas high-ridged with a locally developed 'Bifang' plough is shown in a table to be thrice as great in 19 years as adjacent untreated sites can show in 28. Photographs illustrate root development on this ridge. [Cf. *For. Abstr.* 15 (No. 2119).]

1343. SCHÖDL. Auszug aus den Vorschlägen des Regierungsforstamtes Oberpfalz. **[Summary of the [amelioration] proposals of the State forest office, Upper Palatinate.]** *Mitt. StForstverw. Bayerns* No. 26, 1951 (127–49). [G.]

These outline the further work needed for the improvement of degenerated stands and soils in the Upper Palatinate.

1344. WIRTH. Berichte des Regierungsforstamts Oberfranken über das Kulturverfahren auf Krüppelwaldböden im FA Schnabelwaid. **[Report of the Upper Franconia state forest office on the planting method used on soils carrying stunted forest in the Schnabelwaid forest district.]** *Mitt. StForstverw. Bayerns* No. 26, 1951 (150–68). [G.]

Gives detailed statistics of climatic and soil factors, the effects on pH at various depths of the now accepted method of soil restoration, viz. 15–20 cm. ploughing, autumn dressing of 3500 kg./ha. $CaCO_3$, spring harrowing, and sowing 20 kg./ha. of Broom. The work was mainly for the regeneration of blanks caused by snow breakage etc. in exposed sites; without ploughing and liming (introduced 1927) it has proved useless. The local performance of 5 conifer and 7 broadleaved species is described. Broom is the accepted soil improver and provides shelter. The tree species and mixture proportions recommended for different sites are detailed.

1345. HOFMANN. Auszug aus den 'Waldbaulichen Richtlinien für den Reichswald' des Regierungsforstamtes Mittelfranken. **[Summary from 'Guiding principles for state forest silviculture' of the Middle Franconia state forest office.]** *Mitt. StForstverw. Bayerns* No. 26, 1951 (169–78). [G.]

Clear felling and replanting is necessary to restore the soils superficially impoverished by pure Pine stands. The minimum width of clearing is 30 m.; deep soil working, liming, the use of soil-improving species, a race of Pine suited to the site, the creation of suitable mixtures, and complete (to 30 cm.), rather than high ridge ploughing are specified. Liming (where acidity is not exactly measured) should be at 5000 kg. $CaCO_3$/ha., one-half before and one-half after ploughing, but CaO (used on the heavier soils) should always be worked in. *Alnus incana* is the best soil improver, with *A. glutinosa* for damper sites; lupins, Broom, *Prunus serotina*, Oak and Beech have their place. Pine seedlings (1-year, or for precarious sites 2-year) spaced 1 × 0·3 m. or at an equivalent density are prescribed. The type of plant material and spacing for the other main crop and auxiliary species (Oak, Hornbeam, Lime Robinia, *Prunus avium*, Larch, *Pinus strobus* and Spruce and Douglas Fir) are tabulated. Direct sowing of Oak is preferred at 250–300 kg./ha., or double that rate if it is to be the chief component. Birch is also sown direct. *Alnus incana* is planted as 1- to 2-year seedlings. This state forest has the greatest fire hazard in S. Germany: the fire-fighting organization is adequate, but not fire prevention. Along all railways and roads, a 30-m. strip of broad-leaved species is to be planted, and behind it a zone 30–100 m. wide will be brashed and the material removed.

1346. ROHMEDER, E. Aufforstungs- und Meliorationsprobleme auf armen Waldböden. **[Reforestation and amelioration problems on poor forest soils.]** *Mitt. StForstverw. Bayerns* No. 26, 1951 (179–94). [G.]

Discusses theoretical and practical bases for the restoration and maintenance in productivity of the impoverished Pine soils [cf. *For. Abstr.* 13 (No. 2125); 14 (No. 2217)]. The 'Krüppelwald' or stunted forest, where Scots Pine does not reach yield class V, covers in Bavaria about 40,000 ha., while the area covered by classes inferior to II is 180,000 ha. Practically all the pure Pine and many pure Norway Spruce stands of Germany show similar degradation. The key to lasting soil improvement is to convert raw humus into mild or, where the former is absent, to provide the latter from other sources. The soils concerned here are derived from keuper, diluvial, Cretaceous, and ironstone sands, and phyllite, mica-schist and Jurassic materials. For the reduction of heavy heather growth, herbicides (e.g. U46) are under trial. *Der Technik der Kieferkultur* [see *For. Abstr.* 13 (No. 1100)] is quoted as listing 25 types of general- and 16 types of strip-cultivating machines. Complete ploughing is generally suitable, but the 'Bifang' (high ridge) plough is necessary where raw humus or pan are more intractable. Liming is of first importance, its function being to promote mull formation and the circulation of nutrients. Normal doses are 4000–10,000 kg./ha.; $\frac{1}{3}$–$\frac{1}{2}$ of this before and the rest after ploughing. Makes of spreaders, one including stirring and blowing components, are

quoted. Lupins (5–7 kg./ha.) are sometimes assisted by a dose of basic slag. Broom is best on ironstone sands. *Alnus incana* is planted 2 × 2 m., and Birch sown direct at 5–7 kg./ha. Also used in this mild-humus producing work are *Alnus glutinosa*, Elder, *Rhamnus frangula*, Bird Cherry, Robinia and Rowan. Willows and Aspens enter naturally. The correct maintenance of humus is impossible under pure Pine. Pedunculate, Sessile and Red Oaks, Alder, Hornbeam, Lime, Robinia, Poplar, Bird Cherry, Birch and Aspen are suitable auxiliary species, the proportion of which, Schödel recommends, should rise to ⅔ of the population on the worst soils. *Pinus sylvestris* and *P. strobus*, European and Japanese Larch, Douglas Fir and Spruce provide the conifers. Value is put on initial high density. Most broadleaved species are planted as 1- to 2-year seedlings, the Pine and Larch as 1-year. Details are given for fencing. The roedeer population in Pine forests should not exceed 2–3 per 100 ha. Total costs of formation are put at DM.1000–1500/ha. Where money is short, tending should have priority over taking on new work. In pole and timber crops amelioration can be done in strips with suitable thinning and underplanting both of soil improvers and second-storey trees (dibbling of acorns). More trials are needed, but improved growth in standing crops has already been shown.

1347. **Fertilizer experiments.** *Rep. Wattle Res. Inst. S. Afr. 1952/53*, 1953 (26).

Gives the results of applying N, P, K and Ca at three levels to 2- to 3-year *Acacia decurrens* var. *mollissima* on sand, shale and dolerite soils. The effect of liming was obscured by reduced froghopper damage believed to be due to either higher light intensity or distasteful Ca in sap on limed plots. This matter is now under investigation.

1348. Mather, J. R. **The disposal of industrial effluent by woods irrigation.** *Trans. Amer. geophys. Union* 34 (2), 1953 (227–39). 9 refs. H.S.B.

Describes a method used by the Seabrook Farms Co., New Jersey, of disposing of industrially polluted effluent. The effluent resulting from vegetable freezing and canning was sprayed over the floor of an Oak wood to an amount representing a depth of 400–600 in. during an 8-month period. No harm to the vegetation, clogging of the soil, swamping or pollution of the ground-water table resulted and the ground-water level returned to normal during the 4-month winter period when no disposal took place. The surface soils in this area are 79% sand, 11% silt, and 10% clay. It was found that a forest soil could absorb 150 in. in a period of 10 days while adjoining cultivated fields became saturated by 2 in. in one day. The method of transporting the effluent (by canal) and pumping it, is described in detail. Small trees having most or all of their leaves knocked off by the force of the spray were killed. Larger trees, whose crowns were above the spray, were not in general affected. Ericaceous undergrowth was killed and replaced by herbaceous weeds. Since only 3 years have so far elapsed, the permanent results on vegetation cannot yet be known.

238. *Timber Plantation Crops requiring Special Treatment*

1349. Beltram, V. **Večjo pozornost gojenju topolov! [More attention to Poplar cultivation!]** *Gozd. Vestn.* 11 (5), 1953 (129–32). [Sloven.]

A general account of Poplar growing in Slovenia, with description of silvicultural methods to be adopted for hybrid Black Poplars (*Populus 'canadensis'*).

24. TENDING OF STANDS AND TREES

241. *Cleanings*

1350. Köstler, J. N. Ansprache und Pflege von Dickungen. **[The descriptive analysis and tending of stands in the thicket stage.]** *Forstwiss. Forsch.* No. 1, 1953. pp. 80. 31 refs. [G.g.]

An essay on the application and extension of Schädelin's ideas on cleanings, discussing the problems involved and giving—more as instructive examples than as exact quantitative proof of any one point—the results of descriptive analyses by the author's pupils and colleagues of 102 plots in 82 thicket stands (pure and mixed hardwoods, various mixtures of hardwoods and conifers, and pure and mixed conifers) on very diverse sites in S. Germany. These are discussed in a general manner and illustrated with selected plot diagrams, under two heads: I: Description—discussing the importance for scientific study, and the means of recording, specific composition, number of trees/ha., form of mixture, any tendency to form storeys, quality, and estimated prospects of future development. II: Cleanings—discussing from the point of view of silvicultural desirability (not of working techniques, or of costs and returns) the kinds of operation involved, e.g. the 'negative' selection represented by removal of wolf trees or other undesirable elements (diseased or endangering their neighbours), the 'neutral' measure of adjusting the number of trees per unit area, and the 'positive' selection implied in the tending of crowns, manipulation of mixtures, cutting back of branches, topping, and pruning proper.

242. *Thinnings*

See also Nos. 1238, 1407, 1626, 1679, 1726, 1866.

1351. Krishnaswamy, V. S. **Thinning research in India.** *Indian For.* 79 (11), 1953 (581–9).

A review of current projects, including thinning of Teak, *Pinus longifolia*, *Shorea robusta*, *Cryptomeria japonica*, and *Cedrus deodara*. A tree classification for use in thinning studies is given.

1352. Kozdon, P. Cuidados y manejo de los bosques de *Pinus insignis*. **[Care and management of *P. radiata* stands.]** *Montes, Madrid* 9 (53), 1953 (398–400). [Span.]

Short notes on spacing, pruning and thinning of *P. radiata*, based on plantation experience in Argentina.

1353. Limstrom, G. A., and Deitschman, G. H. **Early response to thinning of Shortleaf Pine in Indiana.** *Sta. Note Cent. St. For. Exp. Sta.* No. 82, 1953. pp. 2.

Tabulates figures to show number of trees/acre, d.b.h., height and b.a. increase for plots thinned to different intensities from above and below and for unthinned control plots in a 14-year plantation, 3 growing seasons after treatment. Results suggest that rather heavy commercial thinnings could be made in 12- to 15-year Shortleaf Pine plantations.

1354. Fröhlich, J. Durchforstung und Fichten-Starkholzzucht. **[Thinning and the production of large Spruce timber.]** *Int. Holzmarkt* 43 (18), 1952 (17–20). [G.]

Figures from the Gmunderberg show that for 50- to 60-year Norway Spruce on good sites, thinning has increased both total timber volume and the % of sawtimber. Thinning at 20–30 years is recommended to ensure adequate large timber at 70–80 years. Conversion to mixed forest as a result of the natural regeneration of deciduous trees among the Spruce after thinning is discussed.

1355. Arnswaldt, J. von. Die Stärke des Pflegehiebs in der Buche und ihre Wirkung auf die Stammgrundfläche. **[Intensity of thinnings in Beech stands and its influence on basal area.]** *Forst u. Holz* 8 (17), 1953 (247–50). 6 refs. [G.]

Discusses, on the basis of data from Danish and German stands (1) whether it is necessary to reduce the basal area of the stands below the 'critical' level [cf. *For. Abstr.* 14 (No. 3359)] in order to obtain greater stem increment, (2) whether this is advisable from the management standpoint and (3) whether increased diameter increment endangers stem and crown quality. The author concludes that the 'critical' basal area for Beech, which in Denmark is estimated at about ⅔ of that customary in Germany in the middle life of the stand (Assmann estimating it at about 28 sq. m./ha. in stands of quality class I) may be reduced in the first half of its life, so long as the 'critical' level is later regained through increased diameter increment of the best trees. Stem and crown quality are not endangered so long as a many-storeyed underwood is maintained and thinnings are regulated so as to encourage all-round crown development of genetically sound trees. [Cf. *For. Abstr.* 5 (255); 12 (No. 2507).]

1356. **Natural regeneration [of *Eucalyptus regnans* in Tasmania].** *Rep. For. Timb. Bur. Aust. 1952*, 1953 (20).

Dense natural regeneration (*a*) (900 stems/acre exceeding 3 in. d.b.h.) of *E. regnans*, was thinned to (*b*) 400 and (*c*) 200 stems/acre. Fifteen months after thinning, and following exceptionally wet weather with gales, windthrow amounted to 0·3% on (*a*), 1·3 on (*b*) and 6 on (*c*) of the number of stems. Increment on the best trees of (*c*) was nearly 3 times that on (*a*).

243. *Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)*

1357. Olson, C. E., Jr., and Schneider, A. E. **Observations on the response of Balsam Fir to release.** *Minn. For. Notes* No. 22, 1953. pp. 2.

A study made on 67 Balsam Firs released when a mixed White Spruce/Balsam Fir/hardwood area had been felled 6–12 years before, showed that on average the trees responded well to release. Results are tabulated.

1358. Minckler, L. S., and Roach, B. A. **Estimating girdling time.** *J. For.* 51 (11), 1953 (824–5).

The formula found for time taken to girdle hardwoods in Alabama and Arkansas [cf. *For. Abstr.* 14 (No. 437)] does not fit data for hardwoods in Illinois, where it was found that man-hours may be estimated by multiplying the sum of the diameters in inches by 0·008, or (more roughly) by multiplying the total b.a. of girdled trees by 0·155.

1359. Essais orientatifs d'annélation et d'empoisonnement. **[Experiments in girdling and poisoning.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (108). [F.]

Experiments made on some thousands of trees indicate that most of the common species in the Belgian Congo can be killed by girdling provided that any shoots forming in the neighbourhood of the girdled zone are removed. The speed with which girdling takes effect depends on the thickness of the sapwood. Species with very thin sapwood, such as *Afrormosia elata*, *Macrolobium dewevrei*, *Erythrophleum guineense* and *Dialium excelsum* die within a few weeks; but species with thick sapwood, such as *Oxystigma oxyphyllum*, *Anonidium mannii* and *Cynometra hankei* often take a year or more to die.

1360. Craet, A. A. M. Annélation et empoisonnement des arbres en forêt équatoriale. **[Girdling and poisoning trees in the equatorial forest.]** *Bull. Inform. Inst. nat. Étude agron. Congo belge* 2 (5), 1953 (310–64). 18 refs. [F.f.flem.]

Tests were made on 6000 stems (300 with poison) in the Yangambi forest, where the stand averages 166 trees/ha., 60–350 cm. in girth. The mortality % of 84 species, 18 months after double-hacking into the sapwood is given. Cutting off subsequent adventitious shoots greatly increased mortality. Jan.–Feb. is probably the best season for girdling. Poisoning was also tested with double-hacking (generally efficacious), with discontinuous double-hacking (of limited use) and with bore-holes (highly recommended). Na arsenite at 10% proved most practicable, though stronger solutions work faster. No special season is preferred for this work, but poisoning should follow fresh upon girdling. Most effective was the use of a ¾-litre bottle of Na arsenite solution, the neck of which is inserted into a downward-directed bore-hole (3 × 8–15 cm.) near the tree base.

Costs in Fr. per tree and per ha. are given (man-day at Fr.30). Per ha. these are:—felling and clearing for planting 2550; felling small trees and girdling the rest 666–727; same, but poisoning the largest, 1200; boring 1000 holes/ha. and poison, 620; bottle method at 1 to 5 per tree, 778. The most effective method of killing the 6 most abundant trees is given. One consists of 7 bore-holes per tree and poisoning.

1361. Dawkins, H. C. **Trials of non-toxic arboricides in tropical forest.** *Emp. For. Rev.* 32 (3), 1953 (253–6). 6 refs. [Uganda Forest Department.]

Tests were made of a number of substances applied as basal sprays or paints on several undesirable and resistant tree species. The most effective treatments were with emulsions of butyl esters of 2,4-D and 2,4,5-T in used motor sump oil.

245. *Tending of Trees, Pruning etc.*

See also Nos. 1352, 1593.

1362. EVERSOLE, K. R. **Better marking means cheaper pruning.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 87, 1953. pp. 4.

Data from 2 stands of Douglas Fir selectively pruned 11 and 13 years earlier showed that many of the pruned trees had since passed from dominant to co-dominant or intermediate classes. Conclusions are that in unthinned stands only 50–60/acre of the largest, well-formed dominants should be pruned.

1363. ZEHETMAYR, J. W. L. **Effect of high pruning on bark-peeling costs in Douglas Fir.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (73–4).

Investigation showed that high pruning does not reduce the subsequent cost of barking Douglas Fir poles, and emphasized the point that pruning is only worth while if the pruned stems ultimately reach timber size.

1364. **[Effect of pruning on growth of *Pinus longifolia*.]** *For. Res. India Burma 1949/50, Pt. 1*, 1953 (34–5).

Pruning to $\frac{1}{3}$ and $\frac{2}{3}$ of the height of 13-year-old *P. longifolia* was done in 1939. At the last re-measurement in 1950 there was no significant difference in height between the two treatments and controls. Controls established a superiority in diameter growth in 1944 which has been maintained.

1365. **Pruning Ponderosa Pine.** *Rep. For. Timb. Bur. Aust. 1952*, 1953 (18).

The main conclusions from this experiment are that: (1) pruning reduced diameter growth much more than height growth; (2) on unpruned trees much of the living crown makes no useful contribution to the growth of the tree; (3) under the conditions of the experiment, it is possible to remove 40–50% of the crown without significantly reducing diameter growth.

1366. RALSTON, R. A. **Effect of pruning on growth of Red Pine.** *Tech. Note Lake St. For. Exp. Sta.* No. 405, 1953. pp. 1.

Measurements made 2 growing seasons after pruning on *P. resinosa*, 10–35 ft. tall, pruned to different proportions of their total height, showed that up to 50% of the live crown length can be removed without retarding annual height and diameter growth but that pruning 70% or more definitely retards both.

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS

See also Nos. 1342–6.

1367. MILLER, A. D. **Investigations into the rehabilitation of derelict woodlands.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (33–41).

At Weston Common, Alton Forest, Hants., initial treatment [cf. *For. Abstr.* 13 (No. 1213)] is now virtually complete, and sales of produce have exceeded expenditure by about £23/acre. A good deal of tending has, however, still to be done, which may use up this surplus.

At Gardiner Forest, Dorset, where different methods of converting Hazel coppice into Beech high forest are being compared in a replicated experiment, tending was continued and costed, and assessments of growth and survival made. Casualties were few and no appreciable differences in growth have manifested themselves so far. The treatments under comparison are group planting with small and large groups cleared in the Hazel coppice, strip planting, thinning and under-planting, and complete clearance with planting in the open. The degree of illumination varies from 48% of full light under thinned coppice to 100% in the clear-felled area, and in all cases the amount of light is at present sufficient to permit vigorous growth of the Beech.

At Well Covert, Haldon Forest, Devon, in a type of woodland containing a fair quantity of regeneration of useful species, an experiment has been started to see how much or how little work need be done, and to what extent existing reproduction can be relied on.

26. COMBINATIONS OF FORESTRY WITH AGRICULTURE AND PASTORAL HUSBANDRY (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

1368. Mesure de l'effet 'fumure minérale' de la jachère forestière. **[Measurement of the 'mineral fertilizer' effect of forest fallow.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (144).

The amounts of mineral elements due to the burning of forest fallow were measured directly in the soil at Yaselia. It was demonstrated that the effect of burning is to establish the preponderance of Ca over Mg and K in the cation equilibrium of the soil (before burning: Ca 44, Mg 38, K 18; after burning: Ca 55, Mg 30, K 15). It appears that the cation composition of the forest soil of Yangambi results from the cation composition of the organic matter returned to the soil by the vegetation.

262. *Fuel and Fodder Forests*

See No. 1246.

265. *Strips or Lines at Road, Rail and Canal Sides etc.; Hedgerow Trees*

See also No. 1187.

1369. NESTOROVIĆ, S. Prilog uređenju i podizanju šuma u Forlandu. **[Forest management in the 'Forland'.]** *Šumarstvo* 6 (3), 1953 (182–208). 6 refs. [Serb.e.g.]

'Forland' is the colloquial Serb name in Voivodina province for the strip of land between a river and its levee, particularly along the Danube, Tissa, and Sava. Levees ca. 1500 km. long protect ca. 600,000 ha. of land, $\frac{3}{4}$ of which is arable. A 60- to 90-m. wide central belt of the 'Forland' (total area ca.

5500 ha.) is covered by a belt of trees for the purpose of checking the force of the flood and so protecting the levee. Since the introduction of these protective belts, i.e. for over 100 years, the only species used has been Willow, either pollarded, or trimmed and lopped, leaving the terminal shoot. The author recommends, in addition to Willow, the use of *Populus 'canadensis'*, *Fraxinus americana*, and *Populus robusta*. He also recommends planting *F. americana* in a 30-m.-wide belt next to the levee in staggered parallel rows 1 m. apart, with 2 m. between the trees, and a rotation of 20–25 years. In a 30- to 60-m. adjacent belt (nearer to the river) Poplars would be planted with the *F. americana* where the soil is suitable for Poplar; the latter at 8 m. in the row with *F. americana* at 2 m. These rows would alternate with *F. americana* rows 1 m. apart. The proposed rotation for this belt is 45–60 years. If the soil is unsuitable for Poplars, Willow can be used instead; *F. americana* would preponderate further from the river, while Willow would be dominant, with a *F. americana* understorey.

266. *Shelterbelts, Windbreaks*

1370. HENNEBO, D., and ILLNER, K. Strömungsbedingte Erscheinungen Windschutzpflanzungen und ihre landwirtschaftliche Bedeutung. [**Air currents caused by windbreaks and their significance for agriculture.**] *Dtsch. Landwirtsch.* 4 (11), 1953 (603–7). 25 refs. [G.]

A review of literature—mainly German.

1371. KASHIYAMA, T., TAKAWASHI, K., and KITAMURA, K. [**The capture of sea-fog particles by an experimental shelterbelt.**] *Bull. For. Exp. Sta., Meguro, Tokyo* No. 63, 1953 (1–8 + 5 photos). 10 refs. [Jap.e.]

An experimental belt of White Fir and Sakhalin Spruce 2 m. high and 13 m. broad was established on grassland in the coastal fog-belt of Hokkaido. Results of an investigation on the distribution of moisture from the fog showed that amounts of about 1 mm./hr. were intercepted on the windward side of the belt at a fog moisture-content of 0·3 g./cu.m. and wind velocity of 3·4 m./sec. in the open. *From authors' summary.*

1372. ZEHETMAYR, J. W. L. **Work on problems of afforestation in Scotland and Northern England.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (28–31).

At Skiall in Caithness an experimental shelterbelt, 1½ chains wide and 15 chains long, has been planted on a very exposed ridge. Based on experience gained with a 25-year-old belt at Inchnacardoch, it is to serve as a trial plot for further belts in the far north. The main species used are, in order, an outside line of the prostrate Mountain Pine (*Pinus mugo* var. *pumilio*) followed by two lines of the upright form (*P. mugo* var. *uncinata*) and 3 of *P. contorta*. The centre consists of 7 lines of mixed *P. contorta* and *P. sylvestris* (the latter included as a possible source of small timber), and on the far side the rows of *P. contorta* and *P. mugo* are repeated in reverse order. These 19 lines of plants, spaced at 5 ft. apart, run the whole length of the belt, but within the lines various spacings of from 2 to 6 ft. are being compared in order to find whether the early canopy obtained by close spacing is, or is not, offset by later difficulties in tending. The effect of outside shelter by close-mesh wire-netting fencing is also being tested as an aid to early formation of canopy.

1373. CADMAN, W. A. **Shelterbelts for Welsh hill farms.** *For. Rec. For. Comm., Lond.* No. 22, 1953. pp. 30. 62 refs.

Describes the need for shelterbelts on Welsh hill farms and the best methods of establishing them, and makes recommendations for the design of shelterbelts and choice of species.

1374. WILSE, E. Planting av sneskjermer—lebelter—på høyfjellsovergangene. [**Planting snow-screens—shelterbelts—along [road and railway] crossings over the mountains.**] *Tidsskr. Skogbr.* 61 (10), 1953 (393–5). [Nor.]

As a result of co-operation between road, railway and forest authorities, investigations have begun on the possibility of planting snowbreaks along roads and railway lines crossing the mountains. In 1952, 15,000 native Scots Pine, grown from seed from the upper altitude limits, were planted along the railway on Dovre and 10,000 along the Bergen line. All plants were given a dose of fertilizer. A further 5000 Pines were planted along the road across Dovre. Alaskan species are to be tried. Existing Birch woods are to be extended by planting and sowing.

1375. SUKAČEV, V. N., and PRAVDIN, L. F. [Editors]. Trudy kompleksnoĭ naučnoĭ èkspedicii po voprosam polezaščitnogo lesorazvedenija. [**Papers of the scientific expedition for the study of shelterbelt forestry problems.**] Akademija Nauk SSSR, Moskva. Vol. 1, No. 1, 1951. pp. 504. Many refs. [Russ.]

The expedition was organized in 1948–9, all the parties being under way by Sept. 1949. The aims were: to work out new methods of establishing shelterbelts, to improve silvicultural methods for these, and to obtain a fundamental knowledge of natural conditions in the areas where they are to be created. The expedition covered an area bounded to the W. by the river Don and to the East by the river Ural and the Caspian, there being 7 main routes for the individual parties: (1) Penza-Ekaterinovka-Kamensk, (2) Voronezh-Veshenskaya-Rostov, (3) Saratov-Astrakhan, (4) Kamyshin-Stalingrad, (5) Stalingrad-Stepnoi-Cherkessk, (6) Chapaevsk-Vladimirovka, and (7) Vishnevaya Gora down the Ural to the Caspian. The edaphic, hydrographic, geological, vegetational, climatic, and silvicultural conditions and the fauna (mostly rodents) are described in detail in 13 separate reports for the main routes.

1376. MANTON, S. M. **Desert reclamation in the Soviet Union.** *Trees, London* 17 (2), 1953 (51–8 + 4 photos).

An account, based on personal observation, of the programme of irrigation, shelterbelt-planting etc. for the reclamation of the Kara Kum desert.

1377. MAŠINSKAJA, L. P. Kak zakladyvatj lesnye zaščitnye polosy na vinogradnikah. [**Establishing shelterbelts in vineyards.**] *Vinodelie i*

Vinogradarstvo SSSR, Moskva 10 (6), 1950 (22–4). [Russ.] L.S.

Laboratory and field tests, and answers to a questionnaire, have confirmed the beneficial effect of shelterbelts on the water economy of vines. In a strip from 10*h* to 12*h* (*h* = shelterbelt height) distance from the shelterbelt, the soil moisture content (up to 1-m. depth) during the whole growth period is 25–30% higher than in the unprotected area. The protective effect falls to zero at a distance of 20*h*, while in the immediate neighbourhood of the shelterbelt the soil m.c. is 20% less than in the unprotected area. Recommendations are made for (1) external vineyard shelterbelts, 20–23 m. wide and impermeable, and (2) internal shelterbelts 10 m. wide and permeable. The shelterbelt intervals should be 200–300 m., according to the nature of the soil; intervals and width of shelterbelts also depend on the slope of the ground. The external shelterbelts (mainly Oak or Pine) should be planted in 4–5 rows, the secondary species being *Acer platanoides*, *A. campestre*, *A. tataricum*, *Fraxinus pennsylvanica* var. *lanceolata*, *Gleditsia triacanthos*, *Pyrus communis*, *Caragana arborescens*, *Ligustrum vulgare*, *Ribes aureum*, *Elaeagnus angustifolia* etc. The internal shelterbelts should be established by planting *Pyrus communis*, *P. malus*, *Morus* sp., *Prunus armeniaca*, *Amelanchier* spp., *Cornus mas*, *Ribes* spp.).

1378. Hanbekov, I. I., and Čaškin, M. I. Mehanizacija rabot po polezaščitnym lesonasaždenijam. [**Mechanization of work in shelterbelts.**] *Seljhozmašina, Moskva* 1949 (1), (4–7). [Russ.] L.S.

Describes machines for planting seedlings in shelterbelts, for soil cultivation between the shelterbelt rows, and sowing and other tools used in forest nurseries.

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

See Nos. 1478, 1543, 2157, 2159.

27. Arboreta. Arboriculture for Ornamental Purposes. Hedges and Hedge Plants

See also Nos. 1259, 1557.

1379. Colloque international sur l'organisation scientifique des jardins botaniques (Paris 4–7 juin 1953). [**International conference on the scientific organization of botanic gardens (Paris 4–7 June, 1953).**] *Année Biologique, Paris* 29 (7/10), 1953. pp. 214. [F.] O.R.S.

The entire number is devoted to 39 papers in French or English on the history and work of botanic gardens and arboreta. It includes the following: Collections of trees and shrubs: their scientific organization (*R. Rol*, pp. 323–4); The principal French dendrological collections (*J. Pourtet*, pp. 325–30); The collection of the arboretum of the Domaine des Barres (*P. Turpin*, pp. 331–5); The modern arboretum (*F. Verdoorn*, pp. 421–7); and Vegetation for a southern Californian arboretum (*F. R. Fosberg*, pp. 429–42).

28. Husbandry of Forest Products other than Wood

See also section 892.

281. *Christmas Trees*

1380. **Principles of Christmas-tree management.** *For. Topics B.C. For. Serv.* No. 5, 1953. pp. 11.

282. *Bark Crops*

See Nos. 1064–5, 1107, 1347, 1572–3, 1626, 2080, 2089.

284. *Crops Tapped for Exudations*

1381. David, R. L'origine du cal formé à la surface des cares de pin maritime sous l'influence du 2,4-dichlorophénoxyacétate de sodium et du 2,4-dichlorophénoxyacétate d'alkylamines. [**The origin of callus formed on the surface of freshenings in tapped *Pinus pinaster* under the influence of 2,4-dichlorophenoxyacetates of Na and of alkylamines.**] *Comptes Rendus des Séances de la Société de Biologie et de ses Filiales, Paris* 147 (11/12), 1953 (1074–6). 1 ref. [F.] O.R.S.

[Cf. *For. Abstr.* 14 (No. 3406).] Sections of the new tissue show that it is formed by proliferation of the cells of the medullary rays and sometimes of the secretory canals.

1382. Abe, M., Yokota, T., Yasue, M., and Hosaka, H. [**Yields and methods of obtaining resin from *Picea jezoensis*. Part I.**] *Bull. For. Exp. Sta., Meguro, Tokyo* No. 63, 1953 (118–45). 34 refs. [Jap.jap.e.]

The experiments comprised 200 trees varying from 30 to 68 cm. d.b.h., in mixed forest. Methods used were: (1) The Japanese saw [Sha-koho] method in which cuts are made at an angle of about 45° with a special saw so that resin flows down them to a vertical cut. (2) American methods, (*a*) standard and (*b*) bark chipping. (3) French method. (4) The bark-band system in which bark strips 5 cm. wide and 1 m. long were removed to expose the wood once and for all. H_2SO_4, 50% by wt., was applied for comparison to some of the faces in (1), (2*a*) and (2*b*). Results are given in tables [with English legends]. The highest relative yield from untreated trees was given by (3), average yield per freshening 30·9 g., followed by (2*a*) 21·89 and (1) 16·6 g. H_2SO_4, sprayed in doses of 0·8–1 c.c. per freshening, increased yields from (1) by 106%, from (2*a*) by 47%, and from (2*b*) by 22%. Method (4) gave the best yield/labour result but the resin obtained often contained impurities and was oxidized by long exposure to air. The flow of resin after the face is made may continue with this species for years, but in this experiment 60–70% of the first 10 days' yield flowed in the first 24 hours. Resin-yielding ability,

$$R\left(=\frac{\text{resin yield in g.}}{\text{face width in cm.}}\right)$$

varied considerably even between trees of the same diameter and in similar environments, maximum *R* being nearly 10 times minimum *R*. *R* increased proportionally with diameter. Resin flow was most

vigorous from the cambium layer and longitudinal canals appeared more important than transverse ones. The resin resembled that from *Pinus* spp. but the formation of resin-acid crystals appeared to be slower. Pre-stimulation by heat treatment [blow-torch on the bark] had no effect. High atmospheric temperatures and frequent rainfall favoured resin flow. Bark freshening was the easiest method technically and the French method the most difficult. Acid treatment was easier with the American than with the Japanese face. *From authors' summary.*

1383. Abe, M., and Yokota, T. **[The tapping of Akamatsu (*Pinus densiflora*). I. The effect of H_2SO_4 treatment on yields of oleoresin.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 62, 1953 (21–46). 52 refs. [Jap.jap.e.]

A first year's report. A total of 150 trees was divided into 15 groups (Nos. I to XIV and group D) of approximately equal potential resin yield. Groups I to XI were tapped by the Sha-kaho method (saw-cut V-face widely adopted in Japan since 1921), XII and XIII by bark freshening, and XIV and D by the American cup and gutter method. All groups but I and D were treated with H_2SO_4. Group I was freshened every 3 days. Group XI was freshened weekly and treated with acid fortnightly. Other groups were freshened and acid-treated weekly. Acid concentrations (dosage ca. 1 c.c./tree) were: Groups II–IV, 50%; V–VII, 40%; VIII–X, 30%. The following results were obtained (yield figures compared with group I): (1) The most effective acid concentration was 40% and the best distance between streaks for the acid concentrations tested was 3·0 cm. (2) In groups I–XI the greatest increase in yield (90·1%) was obtained in group III, weekly freshening, 50% acid, 3·0 cm. between streaks, and the next greatest (83·6%) by weekly freshening at 4·0 cm. distance between streaks, 40% acid. (3) Weekly freshening and fortnightly acid treatment as in group XI gave much lower yields than the other treatments. (4) The greatest yield for the whole season in groups I–XI was obtained from group I, but presumably total yields for the acid treatments could also be increased by tapping every 3 days. (5) Weekly tapping by the American method, using 50% acid, gave 102% increase in yield over group I and 80% over group D (American method, no acid). Bark freshening treated with 40 and 50% acid gave lower yields (73·1 and 60·9% respectively above those of group I). (6) Acid treatment kept the resin flowing longer. (7) Actual yields were lowest in August, but the increase in yield as compared with group I was higher than for July or September. (8) The formation of white crystalline resin acid in the resin was retarded by acid treatment. (9) Acid treatments increased yield more in trees of low than of high yield capacity.

1384. Nájera y Angulo, F., and Rifé Lamprecht, M. P. **Resinación con estimulantes químicos. Estudio general y experiencias realizadas en los pinares españoles. II. Ácido sulfúrico. [Resin-tapping with chemical stimulants. General study and experiments in the Spanish Pine stands. II. Sulphuric acid.]** [*Bol.*] *Inst. for. Invest. Exp. Madrid* 24 (65), 1953. pp. 100. [Span.f.e.g.]

[Cf. *For. Abstr.* 13 (No. 1237).] Gives the results of experiments on *Pinus pinaster* for both normal and high French faces. The following régimes were studied: (1) continuous treatment throughout the season with different concentrations of H_2SO_4 (*a*) on a fresh set of trees each year, (*b*) on the same set of trees in successive years; (2) continuous treatment for 50–60% of the season in successive years; (3) discontinuous treatment throughout the season in successive years; and (4) continuous treatment with a reduced number of freshenings. The treatments may be divided into two groups: (i) Those maintaining the normal resin production, while reducing the amount of face to be cut. For this, concentrations of 40–60% may be used continuously throughout the season, reducing the number of freshenings. (ii) Those giving a direct increase in resin production. (*a*) For the continuous treatment of normal faces there are insufficient data to justify formal recommendations; it is advisable, however, to use low acid concentrations (20–30%) and not to apply the stimulants for more than 80% of the season. (*b*) For the continuous treatment of high faces, concentrations should range between 40 and 60% according to the quality of the stand. Factors that must be considered in this type of treatment are the height which the face finally reaches and the length of time for which the treatments will be effective. In general, yields are high during the first few years of the life of the face, only to fall steeply afterwards. Increases of yield in these experiments were much lower than those reported from the U.S.A. Investigations are now being made on the effects of stimulation in relation to the tapping system used.

1385. Strange, J. D. **Use of chemical stimulation as production aid [is] increasing.** *Naval Stores Rev.* 63 (12), 1953 (14–5, 28).

A report on the progress of the method in the U.S. resin industry, with some figures for 1952. Slightly over 29% of producers used chemical stimulation on 38% of the faces worked during that year.

1386. Larson, P. R., and Clements, R. W. **More gum without broadaxe incisions.** *Naval Stores Rev.* 63 (20), 1953 (12–3).

A comparison of yields from trees having (1) a lip inserted in a broad-axe incision, and (2) a nailed-on lip, shows that late-season yields are considerably increased with the latter. The broad-axe incision appears to have an injurious effect on the tree and on resin yields.

1387. Clements, R. W. **How to install spiral gutters.** *Naval Stores Rev.* 63 (21), 1953 (14–5).

286. *Osier-Growing*

1388. Hedley, M. T. **Tenancy agreements—Osier beds.** *J. Land Agents' Soc.* 52 (11), 1953 (501).

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. WORK SCIENCE (WORK STUDIES): GENERAL

302. *Man and Work (Physiology and Psychology)*

1389. KAMINSKY, G. Erfahrungen bei der Durchführung arbeitsphysiologischer Untersuchungen in der Forstwirtschaft. [**Physiological tests of workers in forestry operations.**] *Forstwiss. Cbl.* 72 (9/10), 1953 (301–8). 11 refs. [G.]

Methods of conducting such tests by (1) respiration and (2) pulse counts.

304. *Hygiene. Safety. Accidents and their Prevention*

See Nos. 1795, 1925.

305. *Sequence of Work and Performance (Time and Performance Tables, Evaluation of Work)*

See No. 1358.

307. *Tools, Equipment, Machines and Working Animals: General*

See also Nos. 1312, 1316–7, 1378, 1471–2.

1390. ***Equipment notes on forestry, forest exploitation and woodworking industries.*** FAO, Rome.

A new series of notes, published separately by FAO, on improved equipment for forest operations, exploitation, and woodworking industries: abbreviation in *Forestry Abstracts*: *Equipm. Note, FAO.*

1391. **Equipment news.** *Unasylva* 7 (3), 1953 (137–8).

Descriptive notes, with illustrations, of the following among others: M.A.N. tractors (M. A. N. Ackerdiesel, Maschinenfabrik Augsburg-Nürnberg, A.G., Katzwanger Str. 101, Nürnberg 24); two-drum winch (Alois Krasser Maschinenbau, Edelschrott, Steiermark, Austria); Wrekin mounted sawbench (James Clay Ltd., Wrekin Foundry, Ketley, Wellington, Shropshire, England); and the Belotti mobile crane (Belotti, Via Francia, Genoa, Italy).

1392. **Equipment news.** *Unasylva* 7 (4), 1953 (178–9).

Descriptive notes with photographs, of the following among others: The Soil-Potta press (Clico Ltd., Meadow Works, Meadow Street, Sheffield, England); this produces earthen pots of the equivalent cubic content of a 3-in. (7·5-cm.) flowerpot. The usual compost or soil is used and the pots retain their shape when placed in seed trays etc. until the plant is ready for lining out. The SFI cultivator (Pahlen and Persson, Upplands, Väsby, Sweden) rips parallel furrows (ca. 1·7 m. apart), and may be drawn by a crawler tractor of ca. 2 tons and 30 h.p., or a wheeled tractor of ca. 3 tons and 40 h.p. A set of timber extraction equipment for the Challenger 3 crawler diesel tractor, including winch, canopy, bumper, guards and hook (John Fowler & Co. (Leeds) Ltd., Leeds 10, England). The Boughton winch (T. T. Boughton & Sons Ltd., Amersham Common, Bucks, England). Gyro-84 brush cutter (Servis Equipment Co., 1000 Singleton Blvd., Dallas, Texas, U.S.A.). The Bi-600 high-speed band-saw (Zuckermann Woodworking Machinery, Anastasius-Grün Gasse 22–24, Vienna 18).

31. LOGGING AND TRANSPORT: GENERAL

See also Nos. 1077, 1681.

1393. CHAMBINAUD. L'exploitation forestière en Afrique noire. [**Forest exploitation in equatorial Africa.**] *Rev. int. Bois* 20 (184), 1953 (171–5). [F.]

An account of current methods of felling, skidding, primary conversion, and hauling.

1394. COURSON, G. DE. La production forestière en Gold-Coast. [**Forest exploitation in the Gold Coast.**] *Bois For. Trop.* No. 26, 1952 (403–8). [F.e.span.]

1395. THALMANN. L'exploitation forestière de la S.E.G. (Société d'Exploitations Gabonaises, à Lambaréné, Gabon.) [**Forest exploitation by the S.E.G. at Lambaréné, Gabon.**] *Bois For. Trop.* No. 30, 1953 (22–35). [F.e.span.]

Skidding is done by tractors, hauling by lorries. Loading is mostly done with an ordinary derrick. Road traffic is stopped as soon as it rains, so the roads keep in good condition.

1396. SIMON. L'exploitation de la Société du Haut Ogooué à N'doljé (Gabon). [**Forest exploitation by the Société du Haut Ogooué, Njolé, Gabon.**] *Bois For. Trop.* No. 31, 1953 (15–26). [F.e.span.]

With notes on equipment, e.g. tractors, lorries, and a light motorboat.

1397. JASSOGNE, F. L'exploitation forestière au Congo belge. [**Forest exploitation in the Belgian Congo.**] *Bois For. Trop.* No. 27, 1953 (9–15). [F.e.span.]

1398. HOLEKAMP, J. A. **The preparation, handling, and transportation of pulpwood east of the Rockies.** *Tappi* 36 (2), 1953 (139*A*–144*A*). P.R.

Illustrated description of cutting and skidding operations, loading and unloading lorries, transferring wood to rolling stock, barkers, and long-distance transport by rail and otherwise.

1399. Ottow, A. De opzet van bosexploitatiebedrijven in de buitengewesten, meer speciaal in Oost-Borneo. **[The organization of forest exploitation by private companies in the islands outside Java, especially in E. Borneo.]** *Tectona* 42 (3/4), 1952 (1953), (175–282). 52 refs. [Du.du.e.]

Discusses exploitation in the past, and future problems relating to control by the Forest Service, economic and technical aspects of exploitation and the work involved in surveying areas to be exploited.

32. FELLING AND RELATED OPERATIONS

322. *Felling Season. Preparatory Measures*

See also No. 1999.

1400. **Timber treating.** *Rep. Tenn. Vall. Auth. 1952/53*, 1953 (19).

More than 400 trees of 10 species were poisoned with Na_2HAsO_3, and 6 months later, treated trees were easier to bark than is usual in spring. There appeared to be a relation between ease of barking and bark thickness, thick-barked trees being easier. Radioactive tracers added to the Na_2HAsO_3 indicated a much slower movement in the trees than was expected.

1401. McIntosh, D. C. **Effects of chemical treatment of pulpwood trees.** *Tappi* 36 (8), 1953 (150*A*–160*A*). 10 refs. P.R.

Summarizes the results of experiments conducted in 1943–9 by the Ottawa laboratory on chemical aids in bark removal and on the effects of chemical treatment in reducing the weight and improving the floatability of wood. The trees to be treated were first girdled at about breast height with the aid of a double-bladed handsaw or a small hand tool with a V-shaped knife. The chemicals (24 kinds) were usually applied as pastes. The species treated were: *Pinus banksiana*, *Abies balsamea*, *Picea mariana*, *P. glauca*, *Thuja o ccidentalis*, *Populus tremuloides*, *P. grandidentata*, *P. ba lsamifera*, and *Betula papyrifera*, mostly of average pulpwood size (7–12 in. d.b.h.). In most cases the treatment was applied during the sap-peeling season (May till mid-August). The bark of the treated trees could be removed more easily after the season of easy peeling than that of the untreated trees during the sap-peeling season. The uniform application of As_2O_3 gave the best results. To secure easy bark-peeling in the autumn, the best months to apply chemicals were found to be June and July; later treatment gave results only in the following year. *Pinus banksiana*, *Abies balsamea*, and *Picea glauca* showed significant reduction in weight when felled in autumn following treatment in summer. Poplars showed no change in density, while Birch became heavier after treatment.

1402. **Chemical treatment of standing trees as a method of debarking.** *Rep. B.C. Dep. Lds. For. 1952*, 1953 (38–9).

Na_2HAsO_3 killed *Tsuga heterophylla* and *Alnus rubra* more quickly and easily than NH_4 sulphamate. Only Alder was killed by Esteron (2,4,5-T). Douglas Fir did not respond well to any of these chemicals. Loosening of the bark on the whole stem was found only on *T. heterophylla* after treatment with arsenite.

1403. Holmes, G. D. **Chemical killing of trees to facilitate bark removal.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (42–3).

Application of Na arsenite or NH_4 sulphamate solution to trees of Corsican Pine, Sitka Spruce and Japanese Larch in spring 1951 gave promising results. The treated trees ranged from 3 to 7 in. quarter girth b.h. and were due to be felled in normal thinning operations in the following winter. The most successful of several methods of application tested was to remove the bark to the sapwood in a ring 6–8 in. wide round the stem, and apply the solution with a paintbrush. A 40% solution of Na arsenite killed standing trees of Sitka Spruce and Japanese Larch within a few weeks of treatment. Trees girdled at the same time, without chemical treatment, had apparently normal healthy crowns a year after treatment. Corsican Pine proved less easy to kill and trees treated with Na arsenite were not completely dead until 6 months after application. The bark was satisfactorily loosened on all trees that succumbed rapidly to chemical treatment. Trees treated with NH_4 sulphamate were killed more slowly and bark was incompletely loosened. The trials are still in progress and peeling costs are to be determined.

323. *Felling and Subsequent Primary Conversion*

See also Nos. 1363, 1407–18, 2025.

1404. Parks, W. H. **Barking Redwood logs by hand.** *Timberman* 54 (12), 1953 (138 . . . 142).

A comparison made between barking at the felling site and barking at prepared landings at the mill showed that efficiency (measured by the % of log circumference actually barked) was considerably higher for the latter. The time in man-hours required for each 1000 bd. ft. barked averages roughly the same for barking at the site and at the mill, and varies inversely with log diameter. The relative advantages of both methods are discussed. Among the advantages of mill barking are the accumulation of bark for processing, higher efficiency, greater safety, reduction of fire hazard in the woods and assistance to reproduction, and reduction of surface checking of logs. Disadvantages are the need for investment in plant and equipment, the cost of hauling the bark to the mill, and greater difficulty in handling unbarked logs in the wood.

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE

See also Nos. 1064–5, 1417, 2055.

1405. Fahnestock, G. R. **Chipping takes the hazard out of logging slash.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 125, 1953. pp. 5. 2 refs.

Green slash put through a portable chipper and allowed to dry for two months could hardly be burnt at all except during the hottest, driest part of the day, and even at this period its highest rate of spread was well below the lowest rate for natural slash burnt at evening often in high relative humidities. The average rate of spread in natural slash

was 14 times that of chipped slash. In chipped slash, species appeared to be the chief factor affecting rate of spread; the Pines (*P. monticola*, *P. ponderosa* and *P. contorta* var. *latifolia*) gave the hottest, fastest fires, *Abies grandis* gave a rate of spread ½ that of the Pines, *Pseudotsuga taxifolia* var. *glauca* ½ that of *A. grandis*, and *Thuja plicata*, *Tsuga heterophylla* and *Larix occidentalis* ½ that of *P. taxifolia*. Length of needles was obviously the species characteristic governing rate of spread. Weight per acre of slash had an effect very much weaker and less consistent in chipped than in natural slash. Observations on chipper operation showed that it could be used where slash is heavily concentrated in an accessible strip but that to be economic on normal slash-disposal operations, especially on steep slopes covered with logging debris, it would need to be mounted on a crawler tractor and to have a wider throat, more power, and possibly some form of self-feeding mechanism.

35. PERFORMANCE MEASUREMENTS FOR DETERMINING PIECE RATES IN FELLING AND RELATED OPERATIONS

1406. JOBST, H. Hauerlohntarif—Hauerlohnstatistik. Ein Beitrag zur Beurteilung von Hauerlohntarifen mittels Leistungsstatistiken auf statistisch-mathematischer Grundlage dargestellt an der Stücklohntafel für das Bayerische Hochgebirge. **[Scale of fellers' wages—statistics of fellers' wages. The estimation of wage scales for fellers on a mathematical and statistical basis using performance statistics as exemplified by the piece-work rates used in the Bavarian mountains.]** *Forstwiss. Cbl.* 72 (9/10), 1953 (264–75). [G.]

1407. RALSTON, R. A. **Comparison of man hours required for thinning and clear cutting pole-size Aspen.** *Tech. Note Lake St. For. Exp. Sta.* No. 407, 1953. pp. 1.

Results of a time study showing logging time per cord for low thinning (diam. below 7 in.), crown thinning (diam. above 7 in.), and clear felling in a 50-acre block of *Populus grandidentata* averaging 22 cords/acre are tabulated. Figures were 4·0, 3·6 and 3·0 man-hr./cord respectively.

36. TOOLS, MACHINES AND EQUIPMENT FOR FELLING AND RELATED OPERATIONS

See also Nos. 1027, 1125, 1405, 1419–20, 2025.

1408. PUTKISTO, K. **Barking of timber and transportable barking machines.** *Transl. For. Prod. Lab., Can.* No. 55, 1953. pp. 8. 3 refs. Transl. by E. Perem from *Tied. Metsäteho, Helsinki* No. 73, 1952. [Cf. *For. Abstr.* 14 (No. 2284).] P.R.

1409. JUŠTŠUK, E. Barkning och barkningsmaskiner. **[Barking and barking machines.]** *Medd. svenska TräforsknInst. (Trätekn. Avd.).* No. 34*B*, 1952. pp. 45 + 43 photos, dgms., gphs. 22 refs. [Sw.sw.e.] P.R.

Discusses: bark structure; the effect of barking on wood quality and buoyancy; the different types of barking—manual, mechanical and chemical—with brief descriptions of a number of barking machines based on the principle of cutting, friction of log against log, friction of log against tools, and hydraulic pressure; the use of bark as fuel and of bark presses for removing the water; and the economics of barking, including a comparison of costs with different types of machine.

1410. LIDÉN, S.-Å. Ny barkningsmaskin från Dalarna. **[A new barking machine from Dalarna.]** *Skogsägaren* 29 (9), 1953 (196). [Sw.]

Describes briefly the preliminary form of a barking machine for use in the woods. Driven by a 6–8 h.p. motor, the barking is done by wires stretched above and below the log and mounted on a carriage moving along the length of the log, which is rotated by the claws holding it in position.

1411. DARWIN, W. N. **A tight chain post peeler.** Division of Forestry Relations, Tennessee Valley Authority, Norris, Tenn. 1950. pp. 6.

1412. EISENHAUER, G. Spannungsmessungen an Bügelsägen. **[Strain measurements in bow saws.]** *Forst u. Holz* 8 (21), 1953 (308–10). 1 ref. [G.]

Methods of making such measurements, with examples.

1413. ABEL. Die Instandsetzung der Hobelzahnsäge. **[The maintenance of logging saws with raker teeth.]** *Forst u. Holz* 8 (22), 1953 (325–9). [G.]

1414. **Power saw training: a panel discussion.** *Pulp Paper Mag. Can.* 54 (11), 1953 (154–170). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1321 (*B*–7–*c*).)

Papers on: Training power-saw operators (*I. M. Pond*); Power-saw breakdowns (*G. V. Maurice*); Power-saw manuals (*L. G. Kerr*); Films in power-saw training (*A. M. Stewart*); and Power-saw training program of A[merican] P[ulpwood] A[ssociation] (*H. H. Jefferson*); with a summary of discussion.

1415. ANDRIEVSKIĬ, A. I. **Prolonging the service life of saw chains.** *Transl. For. Prod. Aust.* 1952. pp. 3. Limited distribution. Transl. by A. Kokle from *Lesn. Prom.* 11 (6), 1951 (13–4).

1416. ANTOINE, R., and BERG, A. Essais de tronçonnage de bois tropicaux à la scie á chaîne. Conclusions d'un rapport sur les essais réalisés avec la scie-tronconneuse ATKINS. **[Tests in cross-cutting tropical timbers with chain saws. Conclusions from a report on tests with the Atkins cross-cut chain saw.]** *Bull. Inform. Inst. nat. Étude agron. Congo belge* 2 (5), 1953 (275–9). 1 ref. [F.]

It is considered that in unskilled hands the saw is not robust enough for tropical conditions.

1417. Travaux de défrichement. **[Clearing operations.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (182–4). [F.]

The use of power circular and chain saws for felling in tropical forest is impractical owing to frequent breakdowns. A comparison of the efficiency of treedozers (point of impact at a height of 3 m.) and bulldozers (height of impact at 1 m.) was greatly in favour of the former.

1418. WARRAS, T. Pinotavaran värimerkkauksesta Yhdysvalloisa. **[Paint-marking of pulpwood in the United States.]** *Tied., Metsäteho, Helsinki* No. 92, 1953. pp. 4. [Fi.e.]

Describes with illustrations the Pohle paint gun developed by the Northeast Pulpwood Research Centre for end-marking pulpwood and found capable in American experiments of marking 450 cu.m. piled measure/9-hr. day. Comparison of costs with those for other marking devices shows that although its depreciation and maintenance costs are relatively high, the Pohle spray is cheapest in the long run, relative economy in marking substance being an important factor. *From author's summary.*

37. TRANSPORT

See also Nos. 1694–5.

372/377. *Land Transport*

See also Nos. 1239, 1391–8.

1419. Informations sur le matériel. [**Notes on equipment.**] *Bois For. Trop.* No. 30, 1953 (71–5). [F.]

Notes on equipment, including several tractors and logging arches, the 'Pan' logging winch, and the use of the Warshop motor drill-hammer (normally used for breaking up concrete etc.) to remove the sapwood, from e.g. Iroko, in the forest.

1420. Informations techniques. [**Technical notes.**] *Bois For. Trop.* No. 27, 1953 (61–5). [F.]

Descriptive notes, with drawings, of the following: the Destroyer caterpillar tractor (Vender, S.P.A. Costruzioni Meccaniche, Via S. Clemente 1, Milan); the Promecam transportable hydraulic press for the repair of tractors in the field (Établissements A.R.D.I.C., 71 Blvd. Raspail, Paris 6e); the Tipps Lumber Hoister (Tipps Tool Co. Inc., P.O. Box 547, Laurel, Miss., U.S.A.); the S.J.8 mobile crane (Skagit Steel and Iron Works, Sedro Woolley, Wash., U.S.A.); a hydraulic wedge for tree felling (Barr Equipment Co., Portland, Ore.); and notes on several new developments in tyres and tracks for use on rough terrain.

1421. Allouard, P. Les moyens utilisés en Côte d'Ivoire pour le chargement des grumes. [**Log-loading methods in the Ivory Coast.**] *Bois For. Trop.* No. 28, 1953 (13–9). [F.e.span.]

Describes the following: the Martin log-loader, which hoists and loads sideways on to a lorry; the Latil tractor equipped with winch; tripod and tongs (manual and mechanized).

1422. Kepšta, D. Elektrický nakladač dlhého dreva na vagóny. [**Electrically-driven loader of long logs on railway flats.**] *Pol'ana* 9 (7/8), 1953 (172–6). [Slovak.]

Illustrated description of a mechanical loader invented by Kučer and consisting of an iron frame with 2 pneumatic wheels, an electric motor transmission gear and cable drum at one end and a pulley at the other. The main feature of the loader is the friction drive between the transmission wheel and the drum shaft and the absence of any toothed gears in the whole appliance. The loader is operated by 4 men and is said to give very satisfactory results.

1423. Rešetov, A. V. Preimuščestva kranov i avtopogruzčikov. [**Merits of cranes and lorry-mounted winches.**] *Lesn. Prom.* 12 (9), 1952 (9–13). [Russ.]

In most cases, rotatable cranes are better adapted to the loading work than winches, but not, e.g. in loading tree-length logs on railway flats in the forest log dump after winch skidding.

1424. Rešetov, A. V. Avtomobiljnye èlektro-krany na pogruzke lesa. [**Lorry-mounted electric cranes for log loading.**] *Lesn. Prom.* 12 (10), 1952 (13–5). [Russ.]

[Cf. *For. Abstr.* 15 (No. 761).] Summarizes the results of working with cranes in two forest enterprises in Siberia, and establishes the following recommendations for obtaining the highest output: (1) each crane should be equipped with a pair of chokers for large-diameter logs and two pairs for thinner wood; (2) the crane can be set either between the transport lorry and the stack or in line with the lorry; (3) the logs should not be hoisted to a great height, and when in the air should be controlled by chains or ropes.

1425. Čikov, Ja. I., and Piir, A. I. Pogruzočnaja lebedka s privodom ot koles avtomobilja. [**Loading winch with a drive from lorry wheels.**] *Lesn. Prom.* 12 (11), 1952 (13–6). [Russ.]

Describes and illustrates an appliance driven by the rear wheels of a ZIS-21 lorry. It consists of 4 drums: two driving, mounted on coupled spindles, and 2 auxiliary ones simply to support the lorry wheels. All 4 drums are mounted in a welded frame flush with the road surface, so that the wheels of the lorry contact the drum evenly. The drums are 80 cm. long, diam. 50 cm. The cable is wound on a winch drum forming an extension of one of the driving drums. The maximum power of the winch obviously increases as the wheels and drums get drier and as the load on the lorry increases. For wet drums and an empty lorry, the power is ca. 1000 kg.; for dry drums and a fully loaded lorry, ca. 4300 kg. The operation is described and illustrated for a winch of this kind working in conjunction with twin booms by means of which logs are loaded on the driving lorry itself, connected with a trailer. Different directions and speeds of the cables are easily obtained through the lorry gears. This winch, in use in a Siberian forest enterprise since January, 1952, has given encouraging results.

1426. Kokorev, V. I. Samorascepljajuščiesja čokery na lebedočnoï štabelevke lesa. [**Self-releasing chokers for wood piling by winch.**] *Lesn. Prom.* 12 (12), 1952 (17). [Russ.]

1427. Bredelev, N. V. Zapornoe koljco trelevočnogo trosa. [**Locking ring for skidding cable.**] *Lesn. Prom.* 12 (12), 1952 (16). [Russ.]

1428. Walleczek, F. Eine neue Seilbahn für die Forstwirtschaft. [**A new forest cableway.**] *Int. Holzmarkt* 43 (18–19), 1952 (27–9; 13–4). [G.]

Discusses with illustrations a cableway designed especially for use in selection felling (*Austrian Patent* No. 169,879, 27 Dec. 1951). It is a bi-cable system, with stations arranged continuously in a circle round the area to be cleared. The loading stations and the main collecting point are permanent installations, with concrete or masonry platforms. Separate traction cables are controlled from each collecting point and uncoupling and coupling between one section and the next are automatic. Some typical lay-outs of the loading points on flat

and hilly sites are illustrated. For the former, skidding distance to the loading points should not exceed 150 m. and the collection points should be 300 m. apart. At least 1500 cu.m./year must be carried to be profitable and the area to be served to provide this amount can be calculated from the annual cut. Cable travel is 100 m./min. and 24 carriages, arranged in pairs to take long timber, can carry 15 cu.m./hr. to the main stations. Costs are discussed.

1429. Hofman, G. H. B. Beberapa tjatatan tentang tjikar memakai ban angin. [**Carts with pneumatic tyres for timber transport.**] *Rimba Indonesia* 2 (6/7), 1953 (229–50). [Du.Jav.e.]

Discusses: the advantages and disadvantages of pneumatic tyres on carts drawn by animals; the best form of tyre, brake and other equipment for the work; standardization; maintenance and repair; and costs of transport by pneumatic-tyred carts or by lorries.

1430. Gorbačevskiĭ, V. A. Novye paropodogrevateljnye ustanovki dlja zapuska dvigateleĭ. [**New steam-heating appliances for the starting of engines [during severe frosts].**] *Lesn. Prom.* 12 (10), 1952 (16–9). [Russ.]

Illustrated description of a wood-fired water-tube boiler, with a capacity of 60–70 kg. steam/hour, carried on sledges; the boiler is sufficient for warming up 4 internal-combustion engines during frosts exceeding −20° C.

1431. Kogan, Ju. A. Lesovoznye avtopoezda v Sibiri. [**Timber-transport lorry-trains in Siberia.**] *Lesn. Prom.* 12 (12), 1952 (4–6 + 1 photo). [Russ.]

Illustrated description of the efficiency of transporting logs, using the ZIS-151 or ZIS-21 lorry with a two-axle trailer or with 3 single-axle trailers. The latter combination has given best results; crosswise coupling of the trailers is recommended.

1432. Perfilov, M. A. Tipovye shemy trelevki lesa traktorami KT-12. [**Typical lay-outs for log skidding with KT-12 tractors.**] *Lesn. Prom.* 12 (9), 1952 (5–9 + 4 dgms.). [Russ.]

Illustrated descriptions of 4 typical lay-outs officially recommended for (1) skidding tree-length logs to a narrow-gauge railway, the siding of which bisects the felling site; (2) as (1) but with the siding on one side of the felling site; (3) and (4) skidding timber assortments to lorry or tractor roads, and narrow-gauge railways, these two being variants. [Cf. *For. Abstr.* 14 (No. 2271), in which publication this article is discussed and the diagrams reproduced.]

1433. Tuffier, M. Les véhicules tous-terrains de fabrication européenne. [**Cross-country vehicles made in Europe.**] *Bois For. Trop.* No. 29, 1953 (21–31). [F.e.span.]

Describes a number of 6-wheeled lorries, tractors with semi-trailers, jeep-type vehicles etc. suitable for use in the tropics, manufactured in France, Germany, England and Italy, with illustrations and specifications.

1434. McCoy-Hill, M. **The logging of plantation produce with a Land Rover.** *Emp. For. Rev.* 32 (3), 1953 (251–2 + 4 photos).

Notes on the use of a Land Rover tractor and winch to extract Eucalypt poles from a plantation [in Tanganyika?].

1435. Juta, E. H. P. De grootte van de sleeplading bij gebruik van tractoren met rupsbanden. [**Size of skidding load with crawler-type tractors.**] *Tectona* 42 (3/4), 1952 (1953) (283–96 + tbl.). 6 refs. [Du.e.]

Analyses the factors involved in choice of a tractor for use in the tropics, e.g. gear in which it is to operate, drawbar horse-power, drawbar pull, sliding resistance in kg./ton log weight (varying with soil conditions, tree form, knots on stem etc.). The conditions of the logging area (trees/ha., d.b.h., length of log etc.) must also be considered. A typical calculation is illustrated: for a Caterpillar D7 equipped for logging (weight 14 tons) and arch (4·5 tons) the calculated capacity load was 9 tons. Practical results with this equipment are given in a table; average load was 7·5 tons.

1436. McColl, B. J. **Report on the Bonnard prehauler [with discussion].** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1300 (*B*–8–*a*), 1953. pp. [2] + [4].

Gives details, with illustrations, of the Mark III model for 4-ft. pulpwood, with a centre-frame articulated steering system and a hydraulic loading device.

1437. Belaja, N. M., Lesovoznaja kanatno-reljsovaja doroga s samohodnoĭ lebedkoĭ. [**Cable-operated forest railway with a self-propelled winch.**] *Lesn. Prom.* 12 (11), 1952 (4–7). [Russ.]

Describes and illustrates a forest railway tested recently in one of the Transcarpathian (Ukraine) forest enterprises. The 'train' consists of a wagon pulled by the 'engine' which is a narrow-gauge (76-cm.) flat with a petrol-driven TL-3 winch mounted on it. Two 17-mm. steel cables are fixed at the upper end of the track and run between the rails; under the 'engine' flat they are led upwards over 2 pairs of pulleys to the winch drums which pay them in or out according to the direction of travel. The upward speed was 1·5–3 km./hour, the downward (with a load of 10–14 tons) 8–10 km./hour. While tests are encouraging, the winch clearly required modification to cope with the new demands made on it. The length of the railway was 600 m., with gradients up to ca. 1/3 and curves of 60–20 m. radius. The output per shift in the initial period was 80–100 cu.m., with peak values ca. 150 cu.m.

1438. Petrović, L. Određivanje racionalnog tipa vagona naših šumskih železnica na osnovu koeficijenta tare i koeficijenta iskorišćavanja nosivosti. [**Determination of a rational type of forest-railway wagon on the basis of the 'tare factor' and 'capacity utilization factor'.**] *Glasn. šum. Fak., Beograd* No. 6, 1953 (91–102). [Serb.g.]

The 'tare factor' $\alpha = Qt/Qn$ and the 'capacity utilization factor' $\gamma = Qp/Qn$ are tabulated for different types of forest railway wagons and flats used in Jugoslavia where Qt is the dead weight of the truck, Qn the maximum capacity and Qp the average load. Wagons show better factors than flats.

378. *Water Transport*

See also Nos. 1650, 1754.

1439. Dehn, U. v. Die Holztrift auf einem der bedeutendsten schwedischen Flusssysteme. **[Timber floating on one of the most important Swedish river systems.]** *Z. Weltforstwirt.* 16 (5), 1953 (164–8). [G.e.f.]

Discusses organization, maintenance of channels, timber sorting, labour and costs on the Umeå/Vindelälven floating system.

1440. Selivanov, P. A. Transport lesa po Kamsko-Volžskomu puti. **[Timber transport along the Kama-Volga waterway.]** *Lesn. Prom.* 12 (9), 1952 (20–2). [Russ.]

Analysis of transport costs shows that the most advantageous method of water transport on this waterway is to use returning coal barges; both the floating of roundwood in rafts and the transport of roundwood and converted wood in special craft is more expensive.

1441. Nevskiĭ, E. G. Zimnjaja splotka lesa s primeneniem brevnotasok. **[Winter raft construction with the aid of log elevators.]** *Lesn. Prom.* 12 (11), 1952 (19–21). [Russ.]

Recommends use of a transportable sorting log-elevator, 120 m. long, working at the rafting wharf along the narrow-gauge railway track, for sorting the logs according to size and species. Transportable frames along the elevator serve to bundle the logs, which are then conveyed along the wharf by tractor winch. Describes also and illustrates a lay-out in which the elevator is of the stationary type, as used in practice in some forest enterprises of the Kama and Vyatka region.

1442. Ponce, G. **First Philippine sea-going log raft.** *Philipp. J. For.* 8 (1/4), 1953 (141–57).

Detailed description, with plans, of a sea-going raft containing 256 logs (731·88 cu.m.).

1443. **New flexible type deepsea bundle raft.** *Paper Tr. J.* 135 (21), 1952 (9). P.R.

The raft, developed by O. D. Hallin, comprises 124 bundles, stowed 7–8 bundles (ca. 80 ft.) wide, and 16 bundles long (ca. 800 ft.). Each bundle in every tier is encircled with a single 1¼-in. line and secured with clamps so as to make it entirely self-contained, yet integral with the whole raft, and each tier is similarly secured by three 1¾-in. towing lines.

Six ft. of the raft is under water. The bundles average 6500 bd. ft. and the total content of the raft just slightly exceeds 800,000 bd. ft. The prototype was towed from Ocean Falls to Vancouver (310 miles) in 10 days, and, despite bad weather, arrived at its destination in perfect shape.

1444. Nylinder, P. Nedsvallat virkes flytbarhet. **[The buoyancy of timber that has been frozen in through the winter.]** *Skogen* 40 (9*), 1953 (106*–7*). [Sw.]

The investigation dealt with 1560 logs, frozen in or not, barked or unbarked, Pine or Spruce. The standing trees were measured and d.b.h., height of crown, height of dead branches, age, height and crown diameter were recorded. After felling they were cut into 3 logs, the butt log forming 30% and the middle and top logs each 25% of the tree's height. Diameter and heartwood at both ends, breadth of annual rings and the total number of branches were recorded for each log, as also bark thickness for unbarked logs, and the volume was determined by weighing on land and in the water. The logs to be frozen in were put in a 40 × 20 m. basin constructed of snow and ice, water was sluiced over them until they were completely frozen in below a layer of ice at least 3 dm. thick with a layer of snow ¼ m. thick piled on the ice. All the wood was weighed before the investigation began on 15 March and again after the logs had thawed out (23 April). The logs were all launched at the same time as the normal floating stock, and to simulate unfavourable conditions they were forced down below the surface of the water between 24 July and 22 August. A summary of weather observations during the drying period March–June is given. Density after felling in unbarked Pine was lowest in the butt and highest in the top logs; density of barked logs exceeded that of unbarked ones especially for the butt log. In Spruce there was little difference between barked and unbarked logs but the difference between butt and top logs was greater than for Pine. Top logs of Pine were on an average heavier than those of Spruce, and unbarked butt logs of Pine were 50–60 kg./cu.m. and barked butt logs 100 kg./cu.m. heavier than corresponding Spruce logs. After drying out, barked butt logs of Pine were heavier than top logs, whereas any differences for Spruce were only slight. Unbarked butt logs of Pine dried less well than top logs. The wood that had been frozen in had a higher density immediately after thawing out than before freezing, probably mainly because of water absorption through the end surfaces at the times of freezing and of thawing. After thawing out, drying was rapid, the density after 4 weeks for the barked and after 6–7 weeks for the unbarked wood being roughly the same as for logs that had not been frozen in. There is, however, considerable risk of sinking immediately after the thaw, especially with top logs. Uptake of water by the logs is very rapid for the first 3 weeks and thereafter slow. At the end of floating, in mid-October, the unbarked wood had a higher density than at felling, often exceeding 950 kg./cu.m. particularly in top logs of Spruce and Pine and butt ogs of Pine. With barked logs there was practically no danger of sinking. No difference in the amount of water taken up by thawed and non-frozen logs was established.

1445. Rysk amfibisk traktor för timmerflottning. **[A Russian amphibious tractor for timber floating.]** *Svensk PappTidn.* 56 (19), 1953 (768). [Sw.] P.R.

The tractor, which has caterpillar tracks for use on land, is driven by a propeller in the water. It is equipped with a bulldozer attachment and a winch for breaking up log jams and for driving logs up from the water at the landing place. Its land speed is 10, and its water speed 5 km./hr.

1446. Panteleev, V. V. Struenapravljajuščie razborno-zvenjevye konstrukcii. **[Current-diversion booms with movable trestle supports.]** *Lesn. Prom.* 12 (9), 1952 (22–7). [Russ.]

The trestle support is constructed from logs

3–6·5 m. long of 18–24 cm. diam. Three such logs are connected to form a tripod-type trestle weighted with stones, to which a timber apron 0·8–2·5 m. high and 4–6·5 m. long is fastened. Supports of this type can be used for depths of as much as 2·5 m. and current rates up to 5 m./sec., if they are arranged at an angle of 60° to the main current. The design and construction of booms made of units of different weight are described and illustrated, and various lay-outs discussed.

1447. Bakonina, N. A. Rjaževoĭ naplavnoĭ volnolom dlja lesnyh reĭdov. [**A floating cribwork wave-breaker for water transport depots.**] *Lesn. Prom.* 12 (10), 1952 (23–4). [Russ.]

Investigations have shown the value of floating cribwork wave-breakers for protecting the water-line of collecting depots in artificial lakes from excessive wave motion. Wave-breakers of this type are suitable for depths greater than 3 m. A model wave-breaker, with cribs 2 m. square, 5–10 cm. clearance between the horizontal logs, and total dimensions 26 m. by 8·5 m., is described and illustrated; it has been tested in the lake of a field laboratory with good results.

38. FOREST ENGINEERING

382. *Buildings*

1448. Filičkin, G. L. Sborka ščitovyh domov v lesnyh poselkah. [**Assembly of prefabricated framed-panel houses in forest settlements.**] *Lesn. Prom.* 12 (10), 1952 (5–7 + 9 photos). [Russ.]

These ŠČL-51 type houses, of ca. 20 sq. m. floor area, and in pairs, can be put together in 24 man-hours.

383. *Roads and Bridges*

1449. Hutson, H. P. W. **Low cost roads: their design and construction for timber extraction.** *Emp. For. Rev.* 32 (4), 1953 (316–29 + 6 photos).

Discusses lay-out, methods of improving bearing capacity, waterproofing, making roads on peat, organization of road-making work, and the relation between road system, road-making costs, and extraction costs for thinnings.

1450. Putkisto, K. Hevospolannetie. [**The packed snow road for horse haulage.**] *Repr.* from *Pap. ja Puu* 35 (9), 1953 (349–55). 8 refs. [Fi.e.] (*Tied. Metsäteho, Helsinki* No. 89).

Experimental packed-snow roads were made in snow 30–40 cm. deep by (1) packing it along the edges with a wheel tractor having rubber half-tracks, and in the middle with a roller; and (2) dragging and grading after frost had hardened it. The only maintenance needed was occasional dragging and grading, for which horse-drawn equipment was used. Observations made during the hauling season on changes of air temperature, depth of untouched snow, depth of frost in the soil, the process of hardening of the packed snow, and hardness values of the packed snow, are given in graphs. The hardness values for the packed snow are surprisingly high. These roads stood up well to horse-drawn traffic and to temporary thaws and could be used later in the spring than ploughed roads. They were cheaper because the heavy and expensive first ploughing was eliminated, little maintenance was needed, snow fences were unnecessary and, owing to reduced snow drifting, roads could be taken straight across open ground, although they should be 3–4 m. wide in such places. Further research is desirable. [Photographs illustrating the equipment used, and graphs have English legends.] *From author's summary.*

1451. Lobodanov, N. S., and Kvačadze, N. I. Zimniĭ strug dlja avtoležnevoĭ dorogi. [**Winter road-drag for [clearing snow from] a corduroy road.**] *Lesn. Prom.* 12 (12), 1952 (18–9). [Russ.]

Illustrated description of a light-weight tractor-driven road-drag, developed by the authors and used in the 1951–2 winter in a Lespromhoz [Forest Industry Enterprise] of the Komiles 'Trust'.

1452. Reĭnas, P. D. Ščitovye avtomobiljnye lesovoznye dorogi. [**Plank roads for lorry transport of timber.**] *Lesn. Prom.* 12 (12), 1952 (6–8). [Russ.]

Temporary plank roads connecting the felling sites in Estonia with the road network consist of two tracks, each of which is made of planks 650 × 20–25 × 7·5 cm.; three such planks laid side by side and fastened by cross-members at ca. 1-m. intervals form tracks 60–75 cm. wide.

1453. Whitehorn, E. W. L. **Soil stabilization.** *Roy. Engrs.' J.* 66 (2), 1952 (156–70).

On the use of stabilizers (e.g. cement or bitumen) in the construction of earth roads etc.

1454. Sallenave, P. Petits ponts forestiers en bois. [**Small wooden forest bridges.**] *Bois For. Trop.* No. 31, 1953 (53–60). [F.e.span.]

Details are given of the construction of 12- to 14-m. wooden bridges, for which the use of round rather than sawn wood is recommended for the bridging beams.

385. *Drainage, Irrigation, Sedimentation. Water Supply*

1455. Huikari, O. Ojitusdynamiitin käytöstä metsäojituksessa. [**The use of dynamite for forest drainage.**] *Metsät. Aikak.* 1953 (9), (281–4, 292). [Fi.e.]

[Cf. *For. Abstr.* 14 (No. 1274).] Field experiments have shown that the increase in costs of drainage works with a peat layer exceeding 1 m. in depth or in increasingly stony soil are very much less using dynamite than with hand-digging. Dynamite gives particularly good results when the soil is wet and in clearing stony streams. [Cf. *For. Abstr.* 13 (Nos. 3935–6).] *From author's summary.*

387. *Telephonic Communications etc.*

1456. Playfair, G. A. **Radio communication in forest protection and administration, British Columbia Forest Service.** *Emp. For. Rev.* 32 (4), 1953 (342–50 + 11 photos).

Discusses the effective range of units, patrolling, instruments designed for different purposes, portable sets, installations for ranger stations and Forest District Control Stations. The complex organization and the use of radio communication in forest protection are described, and suggestions are made for improvements.

4. FOREST INJURIES AND PROTECTION

See also No. 1656.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 1550, 1563–4, 1567, 1579–81, 1587, 1590, 1595, 1597–9, 1607–8, 1611, 1613.

414. *Chemical Control*

See also Nos. 1191, 1565–6.

1457. Bosch, H. Begassingsproeven met blauwzuurgas. **[Fumigation tests with HCN.]** *Jaarb. Ver. Proeft. Boskoop 1952* [1953] (36–49). [Du.]

Fumigation experiments were made, in conditions resembling as closely as possible those involved in fumigation before export, on about 200 species or varieties of plants, mostly trees and shrubs, including *Acer* spp., *Alnus glutinosa* and *A. incana*, *Betula verrucosa*, *Fagus sylvatica*, *Fraxinus* spp., *Juglans* spp., *Platanus acerifolia*, *Populus* spp., *Quercus robur*, *Robinia hispida* and *R. pseudoacacia*, *Tilia* sp., and *Ulmus* spp. After treatment in March or April, the plants were stored for a week before planting out with untreated controls, then examined at intervals after planting until the final examination in early August. Results showing the number of plants in good condition of the 3 treated or 2 untreated plants of the different species for each date of treatment are tabulated. Comparatively few plants were killed as a result of the fumigation, but there was clear evidence that growth was delayed. [Cf. *For. Abstr.* 15 (No. 1191).]

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

1458. Junghans, W. Schutz gegen Sturmschäden im Wald. **[Protection against damage by wind in the forest.]** *Holz-Zbl.* 79 (105), 1953 (1125–6). [G.]

Describes and analyses a method claimed in a German Patent Application J5484 III/45f., whereby windthrow and breakage are prevented by anchoring the trees by means of cables, weights etc., using special clamping devices to prevent cambium injuries.

1459. Matsumoto, T. **[Observations and some theoretical considerations on storm damage.]** *Repr.* from *Journal of the Tohoku Branch of the Japanese Forestry Society, Morioka* 2 (3), 1952 (28–30). [Jap.] X.

A study of stem breakage in pure *Pinus densiflora* in Yuwate University Experimental Forest. The maximum wind velocity recorded is correlated with the average stem height and diameter at the point of breakage to show that the force acting on the crown must have been 0·11 of the free wind force.

1460. Campbell, W. A., and Miller, J. H. **Windthrow of root-rotted Oak shade trees.** *Plant Dis. Reptr.* 36 (12), 1952 (490). A.P.B.

The root system of the trees had been weakened by *Polyporus dryadeus* attack. Evidence of such root infection is afforded by the development basally of flat, thickened, yellow-brown to brown fruiting bodies.

1461. **[Damage to Scots Pine on exposed sites.]** *Rep. Minist. Lds., Eire, on Forestry 1943/50*, 1953 (24).

Scots Pine at high elevations suffered severely from defoliation due to exposure. Damage was most severe in young plantations. It was observed in exposed areas that the leading buds of Scots Pine failed to develop and the lateral buds developed strongly, producing multiple forking. *Pinus contorta* does much better on such sites and produces poles at a relatively early age.

423. *Precipitations*

1462. Žagar, B. O snežnih plazovih v LRS. **[Snow avalanches in Slovenia.]** *Gozd. Vestn.* 10 (10), 1952 (289–98). 3 refs. [Sloven.sloven.]

In the 1951–2 winter 205 avalanches, $\frac{3}{5}$ of which caused considerable damage, were recorded in the forest-covered mountains. Their width varied from 20 to 600 m., their length from 200 to 2500 m. Most occurred at about 1000 m. altitude. The causes of avalanches are discussed, and the part played by forests in preventing avalanches is stressed.

1463. Basham, J. T. **Extensive tree mortality caused by hail in Quetico Provincial Park.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (2).

Examination of a large area in which the trees were almost all dead (spotted from the air in 1952) showed that they had been killed by a severe hail storm, probably during the 1951 growing season. All species were affected, but *Pinus banksiana*, *P. resinosa* and *P. strobus* appeared to be the most susceptible. [Cf. *For. Abstr.* 15 (No. 359).]

425. *Chemical Influences (Atmospheric)*

1464. **Effects of atmospheric pollution on vegetation.** *Nature, Lond.* 172 (4380), 1953 (659–61).

Summarizes papers read at a session of the Botany and Forestry Sections of the British Association meeting in Sept. 1953. (1) Ill effects on evergreens, particularly conifers, at Kew (*C. R. Metcalfe*); (2) damage to trees at Woburn from fluorine emitted from brickworks (*T. R. Peace*); (3) a review of the problem in North America (*H. G. Champion*).

426. *Electrical and Cosmic Influences*

1465. Verhalten der Bäume beim Gewitter. **[Behaviour of trees during thunderstorms.]** *Holz Roh- u. Werkstoff* 11 (8), 1953 (321). [G.] P.R.

Statistics relating to the numbers of trees of different species struck by lightning in Germany.

43. FOREST FIRES

431. *Predisposing Factors and Causes. Fire Danger. Fire Behaviour*

See also No. 1405.

1466. HARDY, C. E. **Half-inch fuel-moisture sticks—how they are made.** *Fire Control Notes* 14 (4), 1953 (1–8).

1467. FAHNESTOCK, G. R. **Inflammability of the current year's logging slash.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 124, 1953. pp. 10.

Preliminary experiments on burning dry slash of *Pinus monticola, Thuja plicata, Pseudotsuga taxifolia,* and *Tsuga heterophylla* show that the rate of spread was primarily influenced by quantity of fuel, increasing rapidly with weight from 7·5 to 32·5 tons/acre. Species had little effect apart from the failure of fires to spread in *light* slash of Hemlock, a species that loses its needles.

1468. FAHNESTOCK, G. R. **Relative humidity and fire behaviour in logging slash.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 126, 1953. pp. 5. 1 ref.

Results of experiments in slash burning on 36 plots at a time when relative humidity was increasing rapidly, showed a rapid reduction in rate of spread as humidity increased on plots with light and medium slash (7·5 and 20 tons dry weight/acre respectively) but no significant difference on those with heavy slash (32·5 tons/acre).

432. *Prevention and Control*

See also Nos. 1345, 1405.

1469. **Temperatures of vehicle exhaust system: a fire hazard.** *E. D. Rep. U.S. For. Serv.* No. 22, 1953. pp. 7 + 5 dgms. 4 refs.

Investigation of the exhaust systems of a car and 4 types of truck shows that the temperatures attained are more than sufficient to ignite light fuel. The principal danger, during cross-country driving, is the lodging of dead grass in the region of the first bend in the exhaust system. Overhead exhausts would eliminate the danger.

1470. Études des coupe-feu. **[Studies on permanent living fire-breaks.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952,* 1953 (123).

Further observations of the permanent fire-breaks of *Sweetia brachystachya* mentioned in the previous year's report [cf. *For. Abstr.* 14 (No. 1292)] showed that satisfactory establishment had been obtained by direct sowing after simple hoeing, or by spot sowing. Stump planting gives more regular growth and better resistance to competing grasses. The use of large (1-m.) stumps proved the most economical as it needed fewest cleanings. A detailed study of costs is being made in view of the possible value of *Sweetia* fire-breaks for the protection of savanna under afforestation and of paddocks, and for the production of firewood on degraded soils.

1471. **Edwards tool sharpening outfit.** *E.D. Rep. U.S. For. Serv.* No. 21, 1953. pp. 23 + 4 dgms.

The outfit described (with specification) is to be made standard for U.S. Forest Service fire-fighting units. Detailed descriptions and illustrations are given of the tool-holding jig, grinder, and electric generator.

1472. LUKE, R. H. **Tractor-plough units for constructing fire lines.** *Aust. Timb. J.* 19 (8), 1953 (576–7).

Discusses the use by the Forestry Commission of New South Wales of a specially developed plough or scraper for use with a light tractor to give a fire-line 4 ft. wide. Tests in a variety of forest conditions were successful and total costs (labour, plant hire and running costs) are estimated at £2/mile. Speed of fire-line construction is from 1 to 3 miles/hour.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

1473. WILLIAMS, A. M., JR. **How to measure forest fire damage.** *For. Fmr.* 13 (1), 1953 (6–8).

Explains the use of the forest fire damage appraisal tables issued by the Southeastern Forest Experiment Station. [Cf. *For. Abstr.* 13 (No. 2244).]

1474. THOM, R., and ANDERSON, M. **Illinois fire damage appraisal system.** *Fire Control Notes* 14 (4), 1953 (32–4).

1475. WILLIAMS, A. M. **Determining burned area by aerial mapping.** *J. For.* 51 (11), 1953 (825–6).

In order to estimate the area of forest burnt in the autumn of 1952, the Tennessee Valley Authority made an aerial survey. Sorties were flown to cover strips representing 10% of the area concerned, and an observer plotted the burnt areas on a map. The amount of burnt land was then determined by grid count, and the % so derived was applied to the total area. The best height for flying was found to be 500 ft. and an average speed of 60 m.p.h. enabled plotting to be done with a high degree of accuracy.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See also Nos. 1064–5, 1077, 1251–2, 1368, 1467–8.

1476. Influence des feux de brousse sur la régénération des coupes. **[The influence of prescribed burning on the regeneration of felling areas.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952,* 1953 (115). [F.]

A comparison was made of the effects of early and late burning. It was found that large trees of *Marquesia macroura* were very susceptible to late burning. Measurement of temperatures reached in late burning showed that these exceed 280° C. at the foot of a tree and diminish with increasing height, to 65–90° at crown level (3–8m.).

1477. BUELL, M. F., and CANTLON, J. E. **Effects of prescribed burning on ground cover of the New Jersey Pine region.** *Ecology* 34 (3), 1953 (520–8). 14 refs.

The effect on shrub cover is greatly to reduce it; herbs and mosses in general increase with increased frequency of burning. One of the results is to favour Pine reproduction.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 1070, 1082, 1359–61, 1400–3, 1533.

1478. ALTONA, R. E., and HATTINGH, E. R. **Weed control in veld and pastures.** *S. Afr. J. Sci.* 49 (10), 1953 (317–9). 7 refs. A.P.B.

Summarizes methods of controlling thorn scrub (chiefly *Acacia* spp.), *Stoebe vulgaris*, and *Senecio* spp.

1479. BROWN, J. M. B. **The Rhododendron problem in the woodlands of southern England.** *Quart. J. For.* 47 (4), 1953 (239–53 + 4 photos). 7 refs.

Rhododendron ponticum, native to the east and west parts of the Mediterranean vegetation region, was introduced to Britain in 1763 and has since become thoroughly naturalized in woodlands and shrubberies, particularly on sandy podzolic soils. The vigorous colonies resulting from the dissemination of seed from planted ornamental avenues and clumps are in many cases a serious hindrance to the regeneration of woods by planting or natural seeding, while the clear cutting of Rhododendrons is very costly and not always of lasting effect. Some aspects of the ecology of *R. ponticum* are here reviewed in relation to the challenge which is presents to silviculture. *Author's summary.*

1480. HOLMES, G. D. **Chemical control of woody weed growth.** *Rep. For. Res. For. Comm., Lond. 1950/51*, 1952 (72).

Two experiments were carried out on vigorous *Calluna* growth on Wareham heath, Dorset, testing a wide variety of chemical sprays. July applications of 0·4% of butyl 2,4-D in oil at 80 gal./acre gave a complete kill with no signs of recovery 1 year after treatment. NH_4 sulphamate applied at 70 lb./acre in 100 gal. of water also gave a good kill.

Both 2,4-D and 2,4,5-T have proved ineffective against *Rhododendron ponticum* even in the seedling stage. The most generally satisfactory treatment was NH_4 sulphamate at 250 lb./acre in 200 gal. of water. This gave a complete kill when sprayed on freshly cut stumps of mature bushes. Application as a foliage spray to stool coppice 2 years after cutting also completely killed the stool root. $NaClO_3$ or Na arsenite, applied to stumps of large bushes, severely checked but did not kill.

1481. HOLMES, G. D. **Chemical control of woody weed growth.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (41–2).

Trials—not yet complete—were made on Sycamore (*Acer pseudoplatanus*) coppice and bramble (*Rubus fruticosus*).

The most satisfactory treatment for bramble has been midsummer foliage spraying with a 2 : 1 mixture of butyl 2,4-D and butyl 2,4,5-T at 0·5% in oil emulsion at 50 gal. solution/acre. This appears to have caused a complete and permanent kill within 9 months after treatment. NH_4 sulphamate applied in solution at 100 lb./acre has also given a good kill. Na 2,4-D or K 2,4,5-T initially killed foliage and young shoots, but growth later showed signs of recovery. Similar results were obtained by the same applications to young regrowth of Sycamore on stumps cut one year previously.

These results appear to confirm the conclusion made from trials on other species, notably ling (*Calluna vulgaris*) and Hazel, that the ester formulations of 2,4-D and 2,4,5-T are more effective against woody species than the water-soluble Na, K, or triethanolamine salts.

1482. SCHÜTTE, K. H. ***Hakea* eradication by means of new herbicides.** *J. S. Afr. For. Ass.* No. 23, 1953 (30–6).

The results of experiments carried out over a period of 12 months with several herbicides applied at the recommended, and at twice the recommended, concentrations, indicate that both mature plants and seedlings of *Hakea gibbosa* can be killed by spraying with Agroxone (2-methyl-4-chlorophenoxyacetic acid), Esterone 2 : 4 : 5 (trichlorophenoxyacetic acid), T.C.A. (Na trichloroacetate) and Fernoxone (Na salt of 2 : 4-dichlorophenoxyacetic acid). In most cases the addition of aromatic oils appeared to enhance the activity of the herbicide.

1483. EGLITE, A. **Use of herbicides to combat rooty [perennial?] weeds in forests.** *Latvijas PSR Zinātnu Akademijas Vēstis, Riga* 1951 (4), (597–608). [[Latv.?] russ.] From *Chem. Abstr.* 47 (13), 1953 (6591–2). P.R.

The most suitable are K, Ca, and Na chlorates; these are more effective on well drained, light, and medium soils; less so on heavy soils. Application of 40–50 g. of $ZnSO_4$/sq. m. along with the chlorates will retard re-appearance for 3–4 years. Pine scrub, heather, and bilberry are effectively controlled by Na_3AsO_4. Isopropylphenyl carbamate 2 g./sq. m. is effective against grasses but non-injurious to dicotyledons. Na 2,4-D or Methoxon 0·5 g./sq. m. is effective on meadows against most dicotyledonous weeds but innocuous to grasses. Mode and time of application for various species are given.

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

1484. BOURCHIER, R. J., and KUIJT, J. **Lodgepole Pine mistletoe [*Arceuthobium americanum*] on White Spruce in Alberta.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (2–3).

The identification of this mistletoe is discussed [cf. *For. Abstr.* 14 (No. 3471)] and the nature of the infestation described in some detail. It seems that White Spruce varies in susceptibility, and a heavily infested tree is often found in close contact with a healthy one. It is also possible that the opening up of a stand increases the chance of transfer of mistletoe from Pine to Spruce.

1485. KUIJT, J. **Dwarf mistletoe on Ponderosa Pine in British Columbia.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (4).

An infestation on Ponderosa Pine in British Columbia has been identified as *Arceuthobium americanum.* This is believed to be the first record of this species on this host in Canada.

1486. KUIJT, J. **Larch mistletoe on Lodgepole and Western White Pine.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (3).

Arceuthobium campylopodum f. *laricis*, common on *Larix occidentalis*, in British Columbia, has also been found in 3 places on *Pinus contorta* var. *latifolia* and once on *P. monticola.*

1487. **Mistletoe control.** *Rep. For. Timb. Bur. Aust. 1952*, 1953 (19).

Inspection of trees injected with 2,4-D [cf. *For. Abstr.* 14 (No. 418)] showed that optimum dosage varies markedly throughout the year, being at a maximum in April, when it is 4–6 times greater than the minimum in November. Best results were obtained from the autumn treatments. The injection of *Eucalyptus polyanthemos* increased its rate of d.b.h. growth. This effect does not appear to last more than 12 months after treatment. The reduction in its rate of d.b.h. growth due to mistletoe was ca. 12% when ca. 25% of the total crown of the tree consisted of mistletoe foliage.

443. *Fungi and Bacteria*

See also Nos. 1119–23.

1488. DOIDGE, E. M., BOTTOMLEY, A. M., PLANK, J. E. VAN DER, and PAUER, G. D. **A revised list of plant diseases in South Africa.** *Bull. Dep. Agric. S. Afr.* No. 346, 1953. pp. 122. Price 1*s.* 6*d.*

Revision of a bulletin last issued in 1931.

1489. ***Haplographium calophylli* Wiehe.** *Distr. Maps Plant Dis.* No. 276, (rev.) 1953. pp. [2].

1490. ***Mycosphaerella aleuritidis* Ou.** *Distr. Maps Plant Dis.* No. 278, (rev.) 1953. pp. [2].

1491. ***Phytophthora cactorum* (Leb. & Cohn) Schroet.** *Distr. Maps Plant Dis.* No. 280, (rev.) 1953. pp. [2].

1492. ANDERSON, E. J., and OKIMOTO, M. **Laboratory studies of effectiveness of 3,5-dimethyltetrahydro-1, 3, 5, 2-thiadiazine-2-thione against certain plant parasitic fungi and nematodes.** *Abstr.* in *Phytopathology* 43 (9), 1953 (465).

Results of tests against *Phytophthora cinnamomi*, *Fusarium moniliforme*, *Penicillium* sp., *Pythium arrhenomanes* and a mixed population of nematodes.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also Nos. 1291–2.

1493. VAARTAJA, O. **Seedling diseases of conifers in Saskatchewan.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (2).

Chiefly damping-off fungi, sometimes associated with nematode attack.

443.3. Diseases of Older Stages

See also Nos. 1620–1.

Stem, Butt and Root Rots; Root Diseases

See also Nos. 1050, 1267, 1314, 1460.

1494. NOBLES, M. K. **Studies in wood-inhabiting hymenomycetes. I. *Odontia bicolor*.** *Canad. J. Bot.* 31 (6), 1953 (745–9 + 6 photos). 8 refs. O.R.S.

Describes cultural characters of the fungus, from 13 softwood and hardwood species, and the decay from which it was isolated. The extensive geographic and host range show that it is a butt-rot of considerable importance in Canada.

1495. DAVIDSON, A. G. **Decay of Balsam Fir.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (2).

A study was made of the degree of decay in Balsam Fir in 4 mainland areas of the Maritimes and two in Newfoundland. The effect of age on % of cull was essentially the same for all areas, though less pronounced in Newfoundland, but after adjusting for age, the % of cull in Cape Breton Island and Western Newfoundland was significantly lower than on the mainland. The difference cannot at present be explained.

1496. DENYER, W. B. G., and RILEY, C. G. **Decay in White Spruce at the Kananaskis Forest Experiment Station.** *For. Chron.* 29 (3), 1953 (233–47).

Cull in *Picea glauca* (based on analysis of 104 trees) averaged 12·5%. Gross and net volume tables for this species in bd. ft. and total cu. ft. are presented. *Polyporus circinatus* var. *dualis* and *Flammula connissans* were the most important causes of root rot and were responsible for 30% of decay volume. *Fomes pini* and *Stereum sanguinolentum* were the most important causes of trunk rot and were responsible for more than 50% of the total decay volume.

1497. BOYCE J. S., and WAGG, J. W. B. **Conk rot of old-growth Douglas Fir in western Oregon.** *Bull. Ore. For. Prod. Lab.* No. 4, 1953. pp. 96. 18 refs.

Trees on 14 plots, $\frac{1}{4}$–$\frac{1}{2}$ acre in area, were felled, cross-cut and scaled for gross volume and volume of decay by *Fomes pini*, in bd. ft., and the results compared with gross and rot volume estimated from the presence of sporophores and swollen knots on the trees. The estimate was within 5% of the actual scale on 10 plots, and within 14–20% on 4 plots. The height above ground of the base and top of the rot column increased progressively with stand age. The average extent of rot above the highest and below the lowest rot indicator increased as the stands aged. Cross-cutting with reference to the position of the rot indicators was found to reduce logging and milling costs. An analysis of radial growth indicated that the development of rot by *F. pini* in a stand is cyclical. The most rapidly-growing trees are infected first, their growth is reduced and they finally drop out of the stand while new infections occur on remaining trees. An estimate of gross and rot volume for all Douglas Fir of 12 in. d.b.h. and over on 459 quarter-acre plots in stands of different ages and on different sites, showed that the number of trees with rot and the volume of decay increased progressively with increasing stand age, but that the increase was cyclical, not regular. Decay incidence was greater in stands of greater diameter. Significant volume losses caused by rot occurred earlier in stands on site II than in stands on site III. Data from a homogeneous group of

plots were used for the analysis of the effects of elevation, slope, soil, vegetation etc. No relationship was found between number of decayed trees and elevations ranging from 1500 to 4500 ft., curvature of slope, soil texture, and soil acidity. Greater amounts of rot occurred on trees on steep slopes, southerly aspects, upper slopes and soils with excessive drainage or shallow soils, and it is suggested that temperature may be the controlling factor. Soils with a higher N content produced more decayed trees. Where *Acer circinatum*, *Achlys* sp., *Oxalis* spp. and *Rosa* spp. predominated, incidence of rot was high, while *Gaultheria shallon*, *Linnaea borealis* and Rhododendron indicated a lower incidence. Pure stands, poor-quality stands and those damaged by fire had more rot respectively than mixed stands, good-quality stands and unburnt stands.

1498. FOSTER, R. E., and FOSTER, A. T. **Estimating decay in Western Hemlock: suggested aids to the management of mature Hemlock-Spruce forests on the Queen Charlotte Islands.** *B.C. Lumberm.* 37 (10), 1953 (42–7). 5 refs.

[Cf. *For. Abstr.* 14 (No. 3481).] A study of quality, based on analysis of 2041 Hemlock [*Tsuga heterophylla*] trees, showed increased volume of grade-1 timber for diameter classes above 30 in. and decreased volume of grade-3 timber for classes above 20 in. Data on the age/diameter relationship in the region showed a progressive increase in age with diameter but the variations were so great within a diameter class (e.g. in the 30-in. class, ages varied from 158 to 528 years, the mean age was 295 and the calculated standard error 53 years) that the age of the individual tree could not be estimated. It was found, however, that bark colour (which is related to tree vigour) superimposed on the age/diameter relationship reduced the total variance in age by ca. 50%. Little decay loss was recorded for trees less than 200 years old, and decay became appreciable only after 300 years, increasing progressively up to 65% of the gross volume at 700 years. Maximum net volumes were recorded in trees about 500 years old, and at 525 years individual trees began to lose more wood by decay than they gained by increment. Decay increased from 2·2% at 15 in. d.b.h. to 46·2% at 70 in., the max. net p.a.i. being realized at about 40 in. Decay in grade-1 logs caused a loss of 13·9%, in grade-2 logs of 8·0% and in grade-3 logs of 10·7%. It increased in grade-1 logs from 1·3 to 32·2% between 250 and 600 years, and from 0·1 to 45·5% between 30 and 70 in. d.b.h. Similar figures for Sitka Spruce [cf. *For. Abstr.* 9 (No. 1274)] are discussed, and the value of these data in relation to the management of mixed stands is considered.

1499. TRUE, R. P., TRYON, E. H., and KING, J. F. **Cankers and decay of living Yellow Birch caused by *Poria laevigata* (Fr.) Cooke in the Monongahela National Forest.** *Abstr.* in *Phytopathology* 43 (9), 1953 (487).

Investigations were made on 8 living trees of *Betula lutea* having bark-covered cankers. The trees averaged 22 in. d.b.h. Extensive white rot was found in the heartwood, and sometimes in the sapwood, extending throughout the merchantable length of the tree. Isolations consistently yielded *Poria laevigata*. The height of the lowest cankers averaged 13 ft. above the ground.

1500. MARINKOVIĆ, P. O zdravstvenom stanju bukovih šuma na Željinu. **[Health condition of Beech forests at Željin.]** *Šumarstvo* 6 (5), 1953 (443–56). 5 refs. [Serb.e.g.]

Presents results of an investigation on the health condition of pure Beech stands (virgin forest, *Fagetum montanum* type) in the central part of the Željin mountain region in Serbia. The aim of the investigation, in 1952, was to determine the extent of the danger of pathogenic fungi. It was found that: (1) the possibility of infection increases with the age of the trees; very old trees are all infected; (2) the incidence of infection depends on the aspect, being 28% for N and up to 80% for S aspects; and (3) the incidence of infection increases with altitude, being e.g. 30% at 1200 m. and 70% at 1700 m. The main pathogenic fungi involved are *Fomes fomentarius*, *F. igniarius*, and *Polyporus squamosus*.

1501. KEENER, P. D. **Unusual numbers of sporophores of a wood-rotting fungus on trunks of *Populus tremuloides* var. *aurea*.** *Plant Dis. Reptr.* 37 (3), 1953 (164–5). A.P.B.

Presents counts of sporophores of *Fomes igniarius* in the San Francisco Mountains of Arizona, where they were observed in abnormal numbers on *P. tremuloides* var. *aurea*.

1502. BLACK, R. L. ***Radulum casearium*, a Poplar decay fungus.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (3).

A study of decay in *Populus tremuloides* in N. Ontario showed that *R. casearium* caused 20% of all cull losses from decay, and an even higher % was found in Manitoba. Laboratory experiments with the fungus showed that optimum temperature for growth was 30° C. and optimum pH between 5·1 and 6·0. The fungus has never been found on Balsam Poplars and it is suggested that the pH of the sap of Balsam Poplars may be inhibitory to its growth.

1503. THOMAS, G. P., and PODMORE, D. G. **Studies in forest pathology. XI. Decay in Black Cottonwood in the Middle Fraser region, British Columbia.** *Canad. J. Bot.* 31 (5), 1953 (675–92 + 16 photos). 15 refs. O.R.S.

A study of stands of *Populus trichocarpa* showed that 70 species of fungus caused decay, 6 causing significant loss and *Polyporus delectans* and *Pholiota destruens* 92% of the loss. The decay and sporophores of the 6 chief fungi are described. A high incidence of decay at an early age was found and a marked slowing down in the rate of increase in decay at 150 years. Average volume of decay per tree infected was low, and decay generally proved important only for recovery of special products, such as plywood. There was a significant reduction in strength in wood containing an early stage of decay caused by *Pholiota destruens*. The use of visible defects as decay indicators was found practicable.

1504. BLACK, R. L. **A white trunk rot of Poplar caused by 'Fungus A'.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (2).

About 10% of Poplars in Whiteshell Forest Reserve, Man., were found to be infected with this so far unidentified fungus; it is generally prevalent in the Prairie Provinces and has also been found in Ontario. In cross-section the incipient decay is light to rusty red with an undulating margin. In longitudinal section the advanced decay is made up of streaks of dark firm wood mixed with pockets of yellow rotten wood. The rot has a faint cheese-like odour.

1505. Fassi, B. Ricerche sul marciume radicale del pioppo in Piemonte. [**Root rots of Poplar in Piedmont.**] In *Studie e Ricerche sulla Pioppicoltura*, Ente nazionale per la Cellulose e per la Carta, Rome. 1953. pp. 43–96. [It.]

Describes damage caused by, and morphology and life history of *Rosellinia necatrix*, *Pholiota aegerita*, *Armillaria mellea* and *Vialina radicicola*, on 'Canadian' Poplars.

1506. Twarowski, Z. Działalność Stacji Walki z Opieńka w r. 1952. [**Work done by the *Armillaria* Control Station [in Poland] in 1952.**] *Sylwan* 97 (3), 1953 (210–5). [Pol.]

Nineteen experimental areas have been set up in 20- to 30-year-old Norway Spruce stands in the Krynica (Carpathian range) forest district, for studies of: (1) liming (two rates: 0·1 and 0·3 kg./sq.m.); (2) sprinkling of tree stumps with NaF; (3) barking of stumps and thick roots; and (4) the comparative effect of summer and winter felling. These areas have a fertile mountain-forest soil with an average pH of 5·4, particularly suitable for *Acer/Fagus/Abies* stands rather than for the artificially introduced Spruce stands with 15% Silver Fir admixture. The following criteria of infection of Spruce by *A. mellea* have been suggested: resin exudation or rhizomorphs near the root collar; cracked and loose bark in the infected places, particularly in the butt. Analysis of 37 Spruce stems that died after the plots were set up showed that *A. mellea* was the primary cause, infestation by insects being only secondary; insects were conspicuously absent where the mycelium was strongly developed. The most serious damage was observed in (1) Spruce stands that had displaced Fir/Beech stands, (2) stands on former arable land or pastures, and (3) former farm forests now incorporated into state forests.

1507. Thornberry, H. H., and Ray, B. R. **Wilt-inducing protein-like pigment from *Armillaria mellea* (Vahl) Quel, isolated from Peach roots.** *Abstr.* in *Phytopathology* 43 (9), 1953 (486).

1508. Malençon, G., and Marion, J. L'*Hypoxylon mediterraneum* (DNtrs.) Ces. et DNtrs. et son comportement épiphytique dans les chênaies nord-africaines. [***H. mediterraneum* and its epidemic behaviour in N. African Oak woods.**] *Rev. Mycol., Paris* 17, *Suppl. colon.* No. 2, 1952 (49–73). 10 refs. [F.] I.M.I.

Describes the fungus, its development, and the nature of the damage. It is rarely parasitic on other hosts and the reason for the extensive and acute attacks on *Q. suber* are discussed. The spread of the fungus is related to the general condition of the trees, being favoured by poor dry soils, root competition, damage caused by grazing, fire and coppicing, and unusually long drought. Soil improvement, control of fire, grazing, pruning and coppicing, and the introduction of less susceptible species in badly affected areas are suggested.

1509. Darley, E. F., and Wilbur, W. D. ***Phytophthora* trunk rot of Washington Palms.** *Abstr.* in *Phytopathology* 43 (9), 1953 (469–70).

A disease of *Washingtonia filifera* in Palm Springs, Calif., is ascribed to a fungus tentatively identified as *Phytophthora parasitica*. The leaves die rapidly and stems become partially or completely rotted. Infection seems to take place through wounds made by the removal of old leaves, the pathogen being carried in irrigation water.

Wilts, Diebacks etc.

1510. Bongini, V. Segnalazioni fitopatologiche. [**Phytopathological records.**] *Ann. Sper. agr.* (*n.s.*) 7 (3), 1953 (XVII–LIV). [It.it.e.] C.G.B.

Includes notes on a die-back of old Larch, Silver Fir, and Austrian Pine at an altitude of ca. 1100 m. near Vercelli. The symptoms appeared first at the apex and gradually extended downwards till the tree was killed. The apparent causal organism, an unidentified species of *Phomopsis* (possibly *P. occulta*), is described.

1511. Wiehe, P. O. **Life cycle of *Botryosphaeria ribis* on *Aleurites montana*.** *Phytopathology* 42 (10), 1952 (521–6). 15 refs. O.B.D.

1512. Mańka, K. O przebiegu holenderskiej choroby wiązów (*Ceratostomella ulmi* (Schw.) Buisman) na terenie miasta Poznania. [**The progress of Dutch Elm disease in the Poznań area.**] *Repr.* from *Acta Soc. Bot. Polon.* 22 (2), 1953 (335–78). 11 refs. [Pol.e.]

Results of field observations made in 1946–9 and checked by isolations of the pathogen from samples of wood are tabulated. *Ulmus montana* showed the highest mortality, followed by *U. campestris* and by *U. effusa*, which shows distinct signs of recovery. *From author's summary.*

1513. Marsden, D. H. **Dutch Elm disease: an evaluation of practical control efforts.** *Plant Dis. Reptr.* 37 (1), 1953 (3–6). 2 refs. A.P.B.

Figures quoted from 2 towns in Massachusetts illustrate the value of a sustained sanitation programme.

1514. Tarjan, A. C., and Howard, F. L. **Comparison of benzothiazolyl-2-thioglycollic acid derivatives with other chemicals for Dutch Elm disease therapy.** *Abstr.* in *Phytopathology* 43 (9), 1953 (486).

Of the materials tested, only benzothiazolyl-2-thioglycollic acid, salicylic acid, Helione A and 8-hydroxyquinoline benzoate, applied to the test trees before they were inoculated with *Ceratostomella ulmi*, produced a reduction of symptoms. They were ineffective when applied after inoculation.

1515. Hoffman, P. F. **Chemicals for therapy of Oak wilt.** *Abstr.* in *Phytopathology* 43 (9), 1953 (475).

Eighty-seven chemicals were tested in soil and foliage treatments of seedling and sapling *Quercus borealis*, *Q. virginiana* and *Q. velutina* showing symptoms of Oak wilt. Urea, lime, oxyquinoline sulphate, Monsanto 4370, Vancide 51, Monsanto 4367, oxyquinoline benzoate and undecylenic acid gave the greatest reduction in disease. Chemotherapeutic effect was not limited to any group of chemicals and was independent of fungitoxicity. Both foliage and soil applications gave significant results. *Endoconidiophora fagacearum* [*Chalara quercina*] was re-isolated from all trees sampled, both diseased and recovered. Vascular streaking was present in trees showing normal foliage following recovery from Oak wilt. Top dieback was variable in recovered trees.

1516. Beckman, C. H., Kuntz, J. E., and Riker, A. J. **The growth of the Oak wilt fungus with various vitamins and carbon and nitrogen sources.** *Phytopathology* 43 (8), 1953 (441–7). 11 refs.

Chalara quercina grew best in liquid media buffered with 12 g. of K_2HPO_4 and KH_2PO_4, proportioned to give pH of 4·0 and 5·0. Of the C sources tested, dextrin and xylose were best; of the N sources, arginine, asparagine and aspartic acid. Pectinase was produced in culture and appears to be important in the development of tyloses and subsequent wilt. *From authors' summary.*

1517. Bretz, T. W., and Morison, D. W. **Effect of time and temperature on isolation of the Oak wilt fungus from infected twig samples.** *Plant Dis. Reptr.* 37 (3), 1953 (162–3). A.P.B.

Laboratory tests showed that the survival of *Chalara quercina* in specimens of small diameter, stored at temperatures of 20–25° C. and over is relatively short. It was also noted that as the time between collection and isolation was lengthened, the development of secondary organisms in the test material became greater. It appears therefore that time and temperature are critical factors in handling Oak-wilt twig samples.

1518. Beckman, C. H., Kuntz, J. E., Riker, A. J., and Berbee, J. G. **Host responses associated with the development of Oak wilt.** *Phytopathology* 43 (8), 1953 (448–53). 30 refs.

Quercus ellipsoidalis trees were inoculated with *Chalara quercina* and radioactive $Rb^{86}_2CO_3$ was used in measuring the rate of movement of liquid in the transpiration streams of diseased and healthy trees. Water flow was also observed in diseased and healthy cuttings. A sudden drop in the rate of movement was noted during a period of 3–4 days preceding the first permanent wilt symptoms. A similar drop in water flow was also observed in twig cuttings. Alternate wilting during the day and recovery at night were commonly observed during the period of low water conductivity before permanent wilt set in. Tyloses were present in wilting, but not in healthy material, and the experiments indicate that tylose formation is the response of the host to the action of the pathogen and is the cause of the reduced transpiration stream. Defoliation experiments showed that the development of the fungus and of any significant metabolites is independent of the leaves. Girdling to produce mechanical reduction of the water-carrying capacity of the xylem to an extent comparable with that found in infected Oaks, induced wilting and death in healthy trees.

1519. Curl, E. A. **Studies on the availability of Oak wilt inoculum in Illinois.** *Abstr.* in *Phytopathology* 43 (9), 1953 (469).

Field studies showed that the greatest concentration of potential inoculum of *Chalara quercina* in Illinois may be expected in March, April and May.

1520. Campbell, R. N., and French, D. W. **Mycelial mats of Oak wilt found in Minnesota during dry weather.** *Plant Dis. Reptr.* 37 (4), 1953 (243). 3 refs. A.P.B.

The development of these mats on dead trees at the end of the growing season and during a prolonged drought, indicates that there is enough moisture under the bark of standing dead trees to permit fungus development in very dry weather.

1521. Boyce, J. S., Jr., and Garren, K. H. **Compatibility types of the Oak wilt fungus in twenty-three Appalachian trees.** *Phytopathology* 43 (11), 1953 (644–5). 2 refs.

Twenty-two of the 23 trees sampled contained only one compatibility type of *Chalara quercina*. In one tree, however, both compatibility types occurred, type B being found throughout the stem and in most of the branches, and type A alone in a single branch in the upper crown, and in mixture with type B in 2 branches. It is thought that type A was probably introduced by inoculations in the upper crown and type B by root infection. [Cf. *For. Abstr.* 14 (No. 104).]

1522. Leach, J. G., and Dorsey, C. K. **A mechanism for liberation of spores from beneath the bark and for diploidization of *Chalara quercina*.** *Phytopathology* 42 (10), 1952 (537–9). O.B.D.

Mycelial mats found under bark of Oaks killed by *C. quercina* in W. Virginia had, near the centre of the mat, one or more thick cushions with daedaloid contact surfaces composed largely of *Chalara* mycelium and a mass of enlarged ovoid fungus cells. Pressure exerted by these cushions made cracks in the bark and, by separating it from the wood, formed a large moist chamber in which the sporulating mycelial mats developed. These cavities are visited by insects, attracted by the odour from the mycelial mats and cushions, which probably act as vectors of the disease. Such cracks not only liberate spores capable of causing infection, but also permit insects to transfer spores of opposite compatibility groups to receptive mycelial mats, and thus bring about ascospore formation.

1523. Griswold, C. L., and Neiswander, R. B. **Insect vectors of Oak wilt fungus.** *J. econ. Ent.* 46 (4), 1953 (708).

Preliminary report on experiments with 2 species of *Pseudopityophthorus* and with *Drosophila melanogaster*. *P. minutissimus* and *P. pruinosus* were found breeding on trees killed by *Chalara quercina*. They are known to leave such areas occasionally to feed on twigs of healthy trees, which then develop symptoms of Oak wilt, although the fungus has not yet been isolated from them. *D. melanogaster* is strongly attracted to sporulating *C. quercina* mats

and to bleeding wounds on twigs of healthy Oak attacked by *P. minutissimus* and *P. pruinosus*. Adult *D. melanogaster* have been proved to carry viable endospores of the fungus externally on the legs, and internally through the intestinal tract. It remains to be proved, however, that the fungus will grow in the bleeding wounds and penetrate the sapwood. [Cf. *For. Abstr.* 14 (No. 2396).]

1524. Bart, G. J., and Griswold, C. L. **Recovery of viable spores of *Endoconidiophora fagacearum* from excrement of insects used in disease transmission studies.** *Abstr.* in *Phytopathology* 43 (9), 1953 (466).

Experiments with *Drosophila melanogaster*.

1525. Himelick, E. B., Schein, R. D., and Curl, E. A. **Rodent feeding on mycelial pads of the Oak wilt fungus.** *Plant Dis. Reptr.* 37 (2), 1953 (101–3). A.P.B.

Damage to mycelial pads of *Chalara quercina* in Illinois appeared to have been caused by rodents, probably squirrels. The possible rôle of squirrels as vectors of the disease is discussed.

1526. Jewell, F. F. **Ascospore longevity of the Oak wilt fungus as affected by temperature and humidity.** *Abstr.* in *Phytopathology* 43 (9), 1953 (476).

Low temperature and low relative humidity appear to favour longevity.

1527. Spilker, O. W. **The longevity of *Endoconidiophora fagacearum* in lumber and other wood products cut from diseased trees.** *Abstr.* in *Phytopathology* 43 (9), 1953 (485).

Attempts were made to isolate *E. fagacearum* from these hosts, in order to find whether the fungus would survive and spread after the material was in use. No fungi were isolated from sawn timber or sawdust. Isolations were made from freshly cut slabs, but further attempts 3 weeks later with the same material failed. *E. fagacearum* was isolated from branches, stumps, trunk and roots when the trees were felled. Three weeks later samples taken from branches and trunk did not contain the fungus; but it was still viable in the roots after 9 months.

1528. Brandt, W. H. **Studies on the effect of *Chalara fagacearum* [*quercina*] on Oak wood and its effect on rates of rotting by associated wood-rotting fungi.** *Abstr.* in *Phytopathology* 43 (9), 1953 (467).

Oak wilt was not found to have any effect on the static bending strength of Oak, nor on rates of decay.

1529. Ernst, R. A., and Bretz, T. W. **American Chestnut susceptible to Oak wilt fungus.** *Plant Dis. Reptr.* 37 (3), 1953 (163). A.P.B.

Inoculation experiments showed that *Castanea dentata* is susceptible to infection by *Chalara quercina* under greenhouse conditions.

1530. Müller, R. Weitere Erfahrungen über den Pappelrindentod (*Dothichiza populea*). **[Further research on Poplar bark disease (*D. populea*).]** *Schweiz. Z. Forstw.* 104 (10), 1953 (534–5).

Further experiments in the artificial inoculation of Poplar seedlings [cf. *For. Abstr.* 15 (No. 404)] showed that *D. populea* is unable to infect even sickly plants during the growing season. Infection takes place only when the plants are dormant and the temperature is favourable to fungal development (above 0° C.).

Cankers, Stem Rusts etc.

See also Nos. 1499, 1656, 2175.

1531. Ribaldi, M. Necrosi corticale e alterazione cromatica del legno prodotte sul pino austriaco da *Phomatosphaeropsis pinicola* n.gen. et n.sp. **[Bark necrosis and discoloration of the wood of *Pinus nigra* var. *austriaca* caused by *Phomatosphaeropsis pinicola* gen. et sp. nov.]** *Ann. Sper. agr.* (*n.s.*) 7 (3), 1953 (837–51 + 15 photos). 13 refs. [It.it.e.] C.G.B.

The disease was first observed in 1951 at Turin. Symptoms are withering of the foliage, necrosis of bark and cambium, and discoloration of the wood (black near the surface and bluish-grey further in). Latin diagnoses of genus and species are given.

1532. Hepting, G. H., and Roth, E. R. **Host relations and spread of Pine pitch canker disease.** *Abstr.* in *Phytopathology* 43 (9), 1953 (475).

Inoculation experiments showed that *Fusarium lateritium* f. *pini* will attack, in addition to the known hosts, *Pinus sylvestris*, *P. rigida* and *P. pungens*. The disease is now known in Virginia, N. Carolina, Tennessee, S. Carolina, Georgia, Florida, Alabama and Mississippi, and was found to be abundant in Haiti on *P. occidentalis* in 1953. There is some evidence that lesions resulting from insect feeding can become infection courts of this fungus, but are not the sole avenue of infection.

1533. McGinn, W. K., and Davidson, A. G. **Studies of White Pine blister rust in Nova Scotia.** *For. Chron.* 29 (3), 1953 (267–72). 3 refs.

Studies were undertaken to determine: (1) the effect of different cutting practices on the establishment of a *Ribes* population and of White Pine [*Pinus strobus*] regeneration; (2) whether blister rust is a major factor in retarding the establishment of White Pine regeneration; and (3) the feasibility and cost of *Ribes* eradication as a direct control measure against blister rust. (1) No relationship was found to exist between *Ribes* establishment and the degree of cutting. Uncut stands where White Pine predominates show evidence of producing a future Pine crop. Forest types supporting White Pine appear to offer the best opportunities for Pine reproduction where clear cutting has given the stand maximum opening. (2) Results of the present study to date do not show that blister rust is a major factor in retarding the establishment of White Pine regeneration. (3) To eradicate *Ribes* from the study area by a complete systematic search required 1 man-hour/acre, but since the number of *Ribes* plants is small and they grow only in moist, low-lying habitats, a complete, systematic search appears to be unnecessary. It is suggested that one man, trained to recognize *Ribes* plants and their probable location, could cover large tracts of forest with a minimum waste of time. *From authors' abstract.*

1534. Arsdel, E. P. van, Riker, A. J., and Patton, R. F. **Microclimatic distribution of White**

Pine blister rust in southwestern Wisconsin. *Abstr.* in *Phytopathology* 43 (9), 1953 (487–8).

Constant-temperature studies of spore germination on agar and of infection on host plants showed that aeciospores germinated effectively from 8 to 24° C. (optimum 16 to 20°), and uredospores from 12 to 28° (optimum 20°). Teliospores produced on *Ribes* sp. at a constant 16° produced sporidia from 4 to 20°, teliospores produced at 20° were erratic in sporidial production, and teliospores produced at 24° were practically sterile. In years of intense infection in Wisconsin the rust was intensified in the same areas rather than becoming generalized. Such areas, e.g. openings in the canopy, sheltered valleys etc., not only had an average temperature below 20°, but also a saturated atmosphere for several more hours a day in later summer and autumn than the surrounding areas.

1535. Hawksworth, F. G. **The pycnial stage of *Cronartium filamentosum*.** *Plant Dis. Reptr.* 37 (4), 1953 (246). 2 refs. A.P.B.

1536. Schmidle, A. Die *Cytospora*-Krankheit der Pappel und die Bedingungen für ihr Auftreten. **[The *Cytospora* disease of Poplar and conditions favouring its occurrence.]** *Phytopath. Z.* 21 (1), 1953 (83–96). 34 refs. [G.] O.R.S.

The damage caused by *C. chrysosperma* is described [cf. *For. Abstr.* 12 (No. 2687)]. In 600 inoculation experiments throughout the year on healthy trees of 50 clones and species, only 24 gave positive results (formation of pycnidia or death of the twig and re-isolation of the fungus). One-year plants of *Populus deltoides* cut down to a height of 30 cm. and inoculated showed (*a*) no fungus attack when sprouting was from the top of the stump, (*b*) infection in the top half of the stump when the sprout was half-way down, and (*c*) infection throughout the stump when sprouting was at ground level. In inoculations on 1- or 2-year plants weakened by wounding or strangling with wire, infection was rapid and general. The most important factor in control is concluded to be establishing Poplars on suitable sites, so that weakness predisposing to infection is avoided.

Foliage Diseases

1537. Reed, H. E. **Occurrence of Arborvitae blight in Tennessee.** *Plant Dis. Reptr.* 37 (4), 1953 (258–9). 2 refs. A.P.B.

Cercospora thujina on *Thuja orientalis* var. *conspicua* in the nursery was successfully controlled in early September and late October by sprays of basic $CuSO_4$ at 4 lb./gal. water, using a good spreader-sticker.

1538. Carter, J. C., and Hoffman, P. F. **Results of fungicide tests for control of leaf diseases of Black Walnut, Catalpa and American Elm in 1951 and 1952.** *Plant Dis. Reptr.* 37 (2), 1953 (114–5). A.P.B.

Results for 13 commercial sprays for the control of *Marssonina juglandis* on Walnut, *Alternaria catalpae* on Catalpa and *Gnomonia ulmea* on Elm. On Walnut, Puratized Agricultural Spray was the most successful; on Catalpa, Carbide and Carbon Chemicals Division Experimental Fungicide 640 and Mathieson Chemical Corporation Experimental Fungicide 466-C gave the best control; on American Elms, Tag 331 gave complete control.

1539. Hoffman, P. F. **Results of fungicide tests for control of Sycamore [*Platanus*] anthracnose in 1952.** *Plant Dis. Reptr.* 37 (2), 1953 (112–3). 3 refs. A.P.B.

[Cf. *For. Abstr.* 14 (No. 1326).] Presents results of tests of 10 commercial sprays. Most effective were 2 organic Hg compounds, Puratized Agricultural Spray and Tag 331 applied at the broken bud stage.

1540. Goode, M. J. **Control of Oak leaf blister in Mississippi.** *Abstr.* in *Phytopathology* 43 (9), 1953 (472).

Dormant spraying for control of Oak leaf blister caused by *Taphrina coerulescens* proved successful with any of the following formulae: a single application of 4–4–50 Bordeaux mixture, zineb (Dithane Z-78), nabam (Dithane D-14 + $ZnSO_4$), Vancide 51, Manzate, Phygon XL, Merculine, Orthocide 406, Cop-O-Zink, Microgel, or tri-basic $CuSO_4$ at customary strengths, using power equipment to cover the dormant buds thoroughly.

1541. Keener, P. D. **A species of *Gymnosporangium* on Quince, Pear and Hawthorn in Arizona.** *Plant Dis. Reptr.* 37 (4) 1953 (235). A.P.B.

This unidentified rust, attacking *Crataegus oxyacantha* and fruit trees, is thought to have alternate hosts in *Juniperus* spp., which abound in the affected area.

Miscellaneous

1542. Vincent, M. **A *Chalaropsis* on Beech.** *Nature, Lond.* 172 (4386), 1953 (963–4). 3 refs.

During an investigation of fungi on recently felled Beech, attention has been directed to an abundant fungus in Knole Park, Sevenoaks, which sporulates at the interface between wood and bark. It is also abundant, but in small patches only, on the sapwood of stumps. It is apparently an undescribed *Ceratocystis* with a brimmed ascospore and a *Chalaropsis* stage. The only previous record of a species of this genus in Britain is *Chalaropsis thielavioides* causing Walnut graft disease. There is no definite evidence that the new fungus attacks living trees, but field observations have shown an initial infection of wounds in standing trees.

45. DAMAGE BY ANIMALS

451. *Mammals*

See also No. 1859.

1543. Costantino, I. N., and Papara, A. El bosque y la ganadería. **[The forests and stock raising.]** *Publ. téc. Minist. Agric. Argent.* No. 17, 1953. pp. 29. 8 refs. [Span.]

Summarizes the effects of grazing stock on the soil, on natural regeneration, and on young stands, discusses the dangers of burning the forests for pasture and presents a plea for the prohibition or control of grazing in the forests.

1544. Rettelbach, B. Wühlmausbekämpfung mit der Herzschen Patrone. **[Control of *Arvicola***

***terrestris* with the Herz fumigating cartridge.]** *Forst u. Holz* 8 (21), 1953 (306–8). [G.]

Describes operations for the control of *Arvicola terrestris* found damaging Poplar in the Ville forest district. A fumigating cartridge generating H_2P and devised by E. von Herz was used. Costs, paying workers DM.1·39 per hr., amounted to ca. DM.55/ha.

1545. THOMSON, J. H. **Vole damage to trees.** *Scot. For.* 7 (4), 1953 (111).

Damage done by voles [*Microtus agrestis*?] at a height of 10 ft. on *Chamaecyparis pisifera* was recently observed in Benmore Forest Garden, Argyllshire. Several trees were found dead as a result of bark gnawing, which may have occurred in the winter of 1947–8. The damage was at first thought to be due to squirrels, but closer examination showed otherwise. The branches, not being whorled in this species, are very close together, right to ground level, and it must have been comparatively easy for the voles to reach the more tender bark near the top of the tree by climbing. The gnawing starts at ca. 4 ft. and becomes increasingly severe further up the stem. The lower branches of the surviving Cypresses have now been removed to a height of ca. 5 ft. to prevent further attack. Voles appear to have a great liking for this species. *Robinia pseudoacacia* is another species that is particularly attractive to voles. A plot of this was planted adjacent to a plot of *Betula lutea* in the spring of 1950. Both plots were killed by voles, but no damage was done to the Birch until the Robinia had been completely destroyed.

1546. SPENCER, D. A., and KVERNO, N. B. **Research in rodent control to promote reforestation by direct seeding. Progress report No. 4, Section 1. 1952–53 field experiments in reforestation and range improvement with tetramine treated seed.** Fish and Wildlife Service, U.S. Department of the Interior, Washington. 1953. pp. 39.

Supplementary to Progress Report No. 3 [cf. *For. Abstr.* 15 (No. 431)]. Further experiments confirm earlier results.

1547. SPENCER, D. A., and KVERNO, N. B. **Research in rodent control to promote reforestation by direct seeding. Progress Report No. 4, Section 2. Organic solvents and their effect on the germination of certain coniferous tree seed. The effect of acetone on seeds of coniferous trees and browse plants.** Fish and Wildlife Service, U.S. Department of the Interior, Washington. 1953. pp. 6 + 7 + 13 tbls. 6 refs.

A continuation of the investigation into the use of tetramine to protect seed from rodents [cf. *For. Abstr.* 15 (No. 431)]. Further study of the effect of acetone (the solvent used with tetramine and other possible protective substances) in inhibiting germination, showed that most Pines, *Sequoia sempervirens* and *Picea mariana*, seldom lose more than 10% of their immediate germinative energy when immersed for one hour in pure acetone. The reaction of Douglas Fir seed varies. One of the factors involved is the presence of moisture during the period when acetone is in contact with the endosperm. Harmful effects occur when (1) the moisture content of the seed is high, (2) water is added, in any proportion, to the acetone, or (3) the seed is moistened with water or stratified in moist sand, before the last vestige of acetone trapped within the seed hull has escaped. Spruce seed in general (with the exception of *P. mariana*) has its immediate germinative energy seriously reduced by one hour's immersion in pure acetone. The results are given briefly of tests of a number of other solvents.

1548. SHAW, E. W. **Effects of tetramine used for rodent control in direct seeding of Douglas Fir.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 89, 1953. pp. 7.

An examination was made of germination and survival during the first growing season of seed treated with tetramine (tetramethylene disulpho tetramine) or untreated, covered or not covered with soil, on milliacre plots in a 100-acre test area. Four censuses had revealed a heavy population of mice and other rodents. Results showed that the tetramine treatment was effective in controlling rodent damage; an average of 1390 seedlings/acre was found. At the end of the growing season 40·5% of the milliacre plots were stocked with at least one seedling. Mortality of seedlings during the summer was 47·6%. Tetramine reduced both germination and survival, but improved techniques to correct this are being evolved. Covering the tetramine-treated seed with soil slightly increased germination and survival but had no effect on untreated seed. A statistical analysis of the data proved the sampling to be adequate. [Cf. *For. Abstr.* 15 (No. 431).]

1549. ADAMS, L. **Relationships of Ponderosa Pine seed numbers and *Peromyscus* populations in northwestern Montana.** *Abstr.* in *Bull. ecol. Soc. Amer.* 34 (3), 1953 (85). A.P.B.

From 1948 to 1953 measurements were made of *Pinus ponderosa* seed numbers. Populations of *Peromyscus maniculatus artemisiae* were also measured by trap lines. Seed and mouse numbers showed a strong correlation for all years except 1953. Examination of stomach contents showed that mice eat most of the available seed each year.

1550. TEVIS, L., JR. **Stomach contents of chipmunks and mantled squirrels in northeastern California.** *J. Mammal.* 34 (3), 1953 (316–24). 13 refs. O.R.S.

Results of stomach analyses on 509 chipmunks (4 species of *Eutamias*) and 273 mantled squirrels (*Citellus lateralis*) at different seasons are tabulated and discussed. Large numbers of larvae and pupae of *Nymphalis californica* were eaten; this species is not in itself of commercial interest but indicates the possible efficacy of rodents in stopping such forest pests as *Neophasia menapia*. Chipmunks also ate *Chermes pinicorticis* infesting young needles of White Fir, and termites, and pieces of Ponderosa Pine bark were found in the stomachs of *E. quadrimaculatus* with unidentified pupae and eggs. Laboratory experiments confirmed that seeds of commercially valuable Pines and Douglas Fir were selected in preference to White Fir and Incense Cedar. It is concluded that from a forestry standpoint it is impractical to assign an economic rating to each rodent species; the harmful or beneficial effect of the

species must be studied separately for different areas and seasons of year. [Cf. *For Abstr.* 14 (No. 463).]

1551. **The campaign against the grey squirrel.** *J. Land Agents' Soc.* 52 (12), 1953 (514–7).

More than 250,000 squirrels were killed in the year ending September 1953. Separate figures are given of kills in individual counties in 1952 and 1953.

1552. JOLY, R. L'écureuil et ses dégâts. **[Squirrel damage.]** *Rev. for. franç.* 5 (9), 1953 (584 + 2 photos). [F.]

Sciurus vulgaris is increasing in numbers in France. Types of damage illustrated are eating seed from cones of *Pinus cembra* and stripping bark from Larch.

1553. FOURCHY, P. Myxomatose, lapin de garenne et reboisement. **[Myxomatosis, wild rabbits, and afforestation.]** *Rev. for. franç.* 5 (10), 1953 (666–8). [F.]

Discusses the possible effects of the introduction of myxomatosis into France.

1554. BARTHÉLÉMY, J. À propos de la myxomatose, maladie contagieuse du lapin. **[Myxomatosis, a contagious disease of rabbits.]** *Rev. for. franç.* 5 (10), 1953 (669–73). 4 refs. [F.]

Discusses the effect of the disease on the rabbit population in France, and the possibility of immunizing tame rabbits.

1555. CHAMPAGNE, E. G. **Browsing deer discouraged by repellent.** *Sta. Note Cent. St. For. Exp. Sta.* No. 80, 1953. pp. 2.

In an experimental plantation of 30 species of conifers established in 1949 and 1950, and damaged by deer in 1949–51, about 2500 trees 12 in.–7 ft. high of the species already found to be most palatable to deer, were treated with a commercial repellent containing an amine complex of Zn dimethyl dithiocarbamate. The trees were in 42 plots well scattered over the site of about 45 acres. Observations in spring 1953 showed that there had been very little browsing during the winter on treated plots, but heavy damage had occurred on unsprayed plots of Pines, the most palatable species.

1556. PIMLOTT, D. H. **A survey of moose damage to forest reproduction.** *Rep. Newfoundld. For. Prot. Ass. 1952/53*, 1953 (19–23).

Balsam Fir is browsed by moose only in winter, and then only lightly, unless Birch and other desirable shrubs are scarce. Black and White Spruce are rarely browsed. Birch is a preferred food at all seasons, and in areas of heavy moose population Birch reproduction is almost entirely prevented.

1557. NAUTIYAL, B. **Plantations under the famine relief scheme, Bahraich forest division.** *Indian For.* 79 (11), 1953 (603–10).

Describes work done to establish plantations of several valuable species, with special reference to costs and to the methods of fencing against game. A ditch and bank was dug all round the planting area, thorny bushes cleared from the area were piled outside the ditch, and *Acacia arabica* seed was sown thickly along the bank so as to provide a live fence in due course. This proved effective against domestic and wild cattle, pigs and porcupines but did not keep out blue bulls or deer.

1558. **Electrified fencing.** *Tech. Note For. Dep. Uganda* No. 6, 1953. pp. 4.

[Cf. *For. Abstr.* 13 (No. 4011).] In the game park near Lake Katwe, haunt of hippo, buffalo, buck, and elephant, a 50-acre plantation in short grass was fenced, with a single electrified strand ca. 2½ ft. from the ground, supported on small posts at 20-ft. intervals. Costs in shillings/mile were: wire, ca. 100; 'Black Pawn' insulators, 200; 'Warden' unit, 206; two 6-volt batteries, ca. 300; erection, neglible. Animals excluded; hippo, completely; buck, probably; buffalo and elephant, 90%. Batteries require recharging every 2 to 4 weeks, depending on leakage.

Research plots in the Opit plantations, including *Chlorophora excelsa*, have been completely protected from buck by a 5-strand fence with live wires at 2, 3 and 7 and dead wires at 1 and 5 ft. The cost of construction in shillings/mile was: materials and equipment, 2077; labour, 440. Maintenance, including battery recharging, 5*s.*/mile; and patrol, 13*s.*/mile/month. At Budongo less success is reported, probably due to not maintaining current.

453. *Insects*

See also Nos. 1457, 2175

1559. SORAUER, P. [Edited by BLUNCK, H.] Handbuch der Pflanzenkrankheiten. Band V. Tierische Schädlinge auf Nutzpflanzen. 2 Teil. 1. Lieferung. **[Manual of plant pathology. Vol. V: Animal pests of useful plants. Pt. 2. No. 1 [: Diptera and Hymenoptera].]** Paul Parey, Lindenstr. 44–47, Berlin SW68. 5th ed. (rev.) 1953. pp. viii + 311. Many refs. [G.] Price [£6. 0*s.* 0*d.*]

Cf. *For. Abstr.* 14 (No. 2449).

1560. RIABININ, S. W sprawie kalendarza fenologicznego szkodników leśnych. **[Phenological calendar for forest pests.]** *Sylwan* 97 (4), 1953 (269–72). 10 refs. [Pol.]

Suggests (1) supplementing the life-cycle calendars of insect pests with indications of synchronous phenological phenomena in the plant world, and (2) finding relationships between the biological rhythm of the pest and that of its hosts. The proposed tables are modelled on those in Čugunin and Juganova's textbook 'Borjba s vrediteljami plodovogo sada' [Control of orchard pests], Moscow, 1950.

1561. KANGAS, E. Über die Objektwahl des Schadenurhebers bei einigen Waldschäden. **[The choice of primary point of attack by some forest pests.]** *Annales Entomologici Fennici, Helsinki* 16 (4), 1950 (145–77). Many refs. [G.] I.I.E.

Discusses factors influencing the ability of borers to enter living trees, i.e. characteristics and condition of the tree itself and the characteristics of the species concerned. Observations on *Scolytus ratzeburgi*, *Blastophagus piniperda* and *Pissodes harcyniae* are reported and discussed, and a theoretical analysis of the initial stages of attack is attempted.

1562. DELEON, D. **Insects associated with *Sequoia sempervirens* and *Sequoia gigantea* in California.** *Pan-Pacific Entomologist, San Francisco* 28 (2), 1952 (75–91). 21 refs. I.I.E.

An annotated list of 52 species from *S. sempervirens* and 20 from *S. gigantea.*

1563. Turbang, J. Contribution à l'étude de la biologie et du rôle forestier de la fourmi rousse (*Formica rufo-pratensis*). **[The biology of the red ant (*F. rufo-pratensis*) and its rôle in forestry.]** *Bull. Soc. for. Belg.* 60 (8/9), 1953 (386–402). 12 refs. [F.]

Describes the life history and habits of this ant, with references to the literature and particular consideration to its predation on the larvae of *Diprion pini* and *Panolis flammea.*

1564. Turček, F. J. **Galls and gall-insects as food of certain birds and mammals.** *Annales Entomologici Fennici, Helsinki* 17 (1), 1951 (17–22). 6 refs. [E.] I.I.E.

Notes on birds and mammals feeding on galls of *Quercus* spp., *Fagus sylvatica, Picea abies* and *Larix decidua.*

1565. **Organo-phosphorus insecticides.** *Nature, Lond.* 172 (4386), 1953 (944–6).

Report of a symposium held at the Imperial College of Science in October 1953, dealing mainly with toxicology.

1566. Brünig, E. Über die Wirkung des Hexachlorcyclohexanes auf die Mitose und das Streckungswachstum in der Wurzel einiger Koniferen. **[The effect of BHC on mitosis and growth of root tips in some conifers.]** *Z. Forstgenet.* 2 (6), 1953 (113–7). Many refs. [G.g.e.]

The effects were studied of (1) individual BHC isomers, (2) a mixture of BHC isomers, and (3) commercial BHC, on the growth of conifer roots, and it was ascertained that BHC has an effect on growth resembling that of colchicine. No qualitative differences in the effects of (1), (2) and (3) were found. The range of efficiency of aqueous concentrations of BHC isomers on root tips of *Pinus sylvestris* was determined and from the values obtained the thermodynamic activity of BHC isomers was calculated. Figures for all isomers exceeded 0·1.

Orthoptera

See also No. 1572.

1567. Richards, M. **An enemy of our Eucalypt forests: The plague phasmid—*Podacanthus wilkinsoni.*** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 6 (3/4), 1952 (11–6).

Describes and discusses the life history of the insect, and its parasites, gives a brief historical outline of outbreaks and discusses possible methods of control.

Isoptera

See No. 1293.

Thysanoptera

See also Nos. 1069, 1572, 1656.

1568. Vité, J. P. Die Schäden des Lärchenblasenfusses (*Taeniothrips laricivorus* Krat.) und ihre Verbreitung. **[Injuries caused by *T. laricivorus* and their distribution.]** *Schr Reihe forstl. Fak. Univ. Göttingen* No. 5, 1953. pp. 65. 40 refs. [G.g.]

Reviews literature and the author's own work on *T. laricivorus* [cf. *For. Abstr.* 13 (No. 3151); 15 (No. 453)], with chapters on: the pest (bionomics and ecology); damage caused (to Larches, and to the winter host—Norway Spruce); and countermeasures (recognition and prognosis, control, and prevention). Although the insect at present appears to be restricted to an area stretching from the E. Carpathians to Switzerland and W. Germany, its potential range is believed to be far wider and might include N. Italy, France, Britain, S. Scandinavia and E. Europe. Populations tend to remain fairly high between outbreaks, thus causing damage which is chronic though not very important biologically. Outbreaks are favoured by shelter from wind, good sites, warm, moist weather, and the presence in the vicinity of sufficient Spruce as winter quarters; they are usually confined to the younger age classes (6–40 years). All races and provenances of European Larch are equally attacked, though certain trees of alpine Larch retain the normal crown form in spite of attack. Japanese Larch is much more resistant, and while hybrids between the two species show an intermediate resistance, their vigour enables them to recover rapidly. Since the attacks on Larch are concentrated upon terminal shoots from July onwards, it is chiefly in height growth than the trees suffer, with bushiness at the top of the crown owing to the development of replacement shoots. Forking, however, is not common. The loss of height increment is estimated at 10–20% for moderately and 20–30% for heavily attacked stands. Diameter increment is not reduced, for all the assimilating foliage area is available in spring and early summer; it may even be increased by the additional foliage of replacement shoots, which are densely beset with short shoots in their second year. Serious additive injury may result if late frost kills many of the long shoots and the *Taeniothrips* population concentrates upon those that survive.

Ordinary contact insecticides appear to be effective against the pest, but silvicultural control is to be preferred, e.g. avoidance of Larch/Spruce mixtures; planting of Larch in groups rather than tree-by-tree if mixtures are unavoidable; promotion of height growth by energetic cleaning; use of Japanese Larch where possible.

Hemiptera

See also Nos. 1071, 1347, 1572.

1569. Benjamin, D. M., Batzer, H. O., and Ewan, H. G. **The lateral-terminal elongation growth ratio of Red Pine as an index of Saratoga spittlebug injury.** *J. For.* 51 (11), 1953 (822–3). 1 ref.

Preliminary figures for coefficients of correlation and regression of lateral bud elongation, expressed as a decimal fraction of terminal bud elongation in (*a*) uninjured, (*b*) spittlebug-damaged and (*c*) DDT-sprayed saplings.

1570. Hanson, H. S. **The green Spruce aphis, *Neomyzaphis abietina* Walker.** *Rep. For. Res. For. Comm., Lond. 1950/51,* 1952 (98–104).

A detailed account of the life history.

1571. Kawecki, Z. Tarcznik niszczyciel (tarcznik San José), (*Quadraspidiotus* (*Aspidiotus*) *perniciosus* Comst.) w Europie i jego pojawienie sis w Polsce.

[*Q.* (*A.*) *perniciosus* in Europe, and its appearance in Poland.] *Prace rol.-lešn. polsk. Akad. Um.* No. 55, 1950. pp. 54 + 7 drawings, 3 maps. 134 refs. [Pol.e.]

The insect was first spotted in Poland in 1949. Observations confirm the theory that fertilized ♀s hibernate.

Lepidoptera

See also No. 1072.

1572. Ossowski, L. L. J. **Notes on insects observed [damaging Wattle plantations] during the period 1952–1953.** *Rep. Wattle Res. Inst. S. Afr. 1952/53*, 1953 (49–54).

Lists, with general notes on damage, parasites and predators, 25 species of the orders Lepidoptera (14), Coleoptera (7), Orthoptera (1), Hemiptera (2), and Thysanoptera (1) damaging Wattles in S. Africa and S. Rhodesia. The approximate acreages reported as infested and (in brackets) completely defoliated by the more important of these during the period were: Wattle bagworm (*Acanthopsyche junodi*) 100,000 (12,000); small Wattle lappet moth (*Anadiasia punctifascia*) 5200 (1000); Wattle noctuid (*Achaea lienardi*) 2000 (1330); large Wattle chafer beetle (*Hypopholis sommeri*) 2000 (390); 'frog-hoppers' (the large green jassid *Bythoscopus cederanus*, and the capsid *Lygidolon laevigatum*) 8000 (4000). In many places skin irritation caused by the hairs of the larvae of the small Wattle lappet moth stopped bark-shipping. Both men and horses were affected, the latter being incapacitated for some time. Though extensive fogging, spraying and soil insecticidal work has probably reduced the population, the damage done in S. Rhodesia by the Rhodesian cockchafer *Eulepida mashora* is still considerable.

1573. **Bionomy of Wattle bagworm [*Acanthopsyche junodi*].** *Rep. Wattle Res. Inst. S. Afr. 1952/53*, 1953 (28). 1 ref.

Using 12,654 bagworms and the average number of eggs (1102) from 33♀s, it was found that the sex ratio was 1♀ to 1·5♂s and the sex factor 0·40; the annual biotic potential (Thomson-Chapman formula) was 440 and the biotic balance (Bremer modified by Zwolfer) was 99·77%.

1574. Patočka, J. Housenky škodící topolech Vel'kého Žitného ostrova v roku 1952. **[Caterpillar pests on Poplars on Vel'ky Žitny island [Slovakia] in 1952.]** *Pol'ana* 9 (6), 1953 (131–3). [Cz.]

Presents results of observations in 1952 on Poplars (mainly *Populus alba*, with a sprinkling of *P. canescens*) in the area of Gabčikovo (floodlands of the Danube in Slovakia). Total larval damage was relatively small, most having been done to terminal buds of Poplar plants and saplings by *Semasia oppressana*, and to Poplar shelterbelts by *Phyllocristis suffusella*, *Sarrothrippus rewayana*, and others. The attack of different species between May and November is described in some detail, and those whose larvae damage catkins, seeds, buds, shoots, wood, and leaves, are listed and described.

1575. Damjanović, S. Još neki podaci i zapažanja u vezi so pojavom jelinog savijača na Tari. **[Some new data and observations in connexion with the appearance of *Epiblema proximana* at Tara.]** *Šumarstvo* 6 (5), 1953 (482–4). [Serb.]

In completion of Milosavljević's note [*For. Abstr.* 14 (No. 1355)], the author gives results of observations on imagos, eggs, and pupae of the insect.

1576. Turnock, W. J. **Some aspects of the life history and ecology of the pitch nodule maker, *Petrova albicapitana* (Busck) (Lepidoptera-Olethreutidae).** *Repr.* from *Canad. Ent.* 85 (7), 1953 (233–43). 8 refs.

This pest, although widespread in Manitoba and Saskatchewan, is not at present causing serious damage. Its life history and distribution are briefly reviewed, and the damage caused and factors influencing its incidence are commented on. No natural control factors have been found; only the growth of trees beyond susceptible size reduces populations.

1577. Stearns, L. A. **The biology and control of the Nantucket Pine moth and the European Pine shoot moth.** *J. econ. Ent.* 46 (4), 1953 (690–2). 5 refs.

Experiments were made with some of the newer insecticides on mixed populations of *Rhyacionia buoliana* and *R. frustrana* on *Pinus resinosa*. All the following treatments were effective against *R. buoliana*: (1) Blackleaf 40 (16 fluid oz.) and Grasselli spreader-sticker (4 fluid oz.), (2) summer oil (Volck, 1 gal.) and lead arsenate (1·5 lb.), (3) BHC (1·5 lb. 6% γ), (4) parathion (10 oz. 25% wettable powder), (5) DDT (1 lb. 50% wettable powder). Spraying was done on 11 June (date of first emergence), 22 June (date of maximum moth activity) and 8 July (date of last emergence). Only the DDT and parathion treatments had any substantial effect on *R. frustrana*. Emergence of the spring brood of *R. frustrana* began between 28 March and 5 April and was complete by 6 June. First adults of the summer brood emerged between 7 and 11 July and emergence was complete on 10 August. The first adults of the single summer brood of *R. buoliana* emerged on 11–14 June, and emergence was complete by 8–11 July. Populations of both species are largest, and damage greatest, on young Pines. It is advisable to limit control operations to young plantations, avoiding well established stands in which spraying is ineffectual and costs are prohibitive. DDT sprays at 1 lb./100 gal. water applied in 9 treatments over the 3 emergence periods of the species are recommended.

1578. **Spruce budworm spraying project in New Brunswick, 1953.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (1–2).

An account of the organization of this co-operative project for the aerial spraying of a million acres [cf. *For. Abstr.* 14 (p. 240)] and the methods used. An innovation was that the spraying was done by pairs of aircraft keeping a flying distance of 250 ft. between them.

1579. Coppel, H. C. **Effects of super-, multi-, and hyper-parasitism on the abundance of *Phytodietus fumiferanae* Rohw. (Hymenoptera : Ichneumonidae), a primary parasite of the Spruce**

budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae). *Rep. Quebec Soc. Prot. Pl. 1950–51* [1953?] (189–93). 8 refs. [E.]

Cf. *For. Abstr.* 10 (No. 2275).

1580. BUCHER, G. E. **Biotic factors of control of the European Fir budworm, *Choristoneura murinana* (Hbn.) (n.comb.) in Europe.** *Canad. J. agric. Sci.* 33 (5), 1953 (448–69 + 1 plate). 7 refs. O.R.E.

Populations of *Cacoecia murinana* were studied in the Vosges Mountains and the Black Forest in an attempt to gain information useful in the biological control of *C. fumiferana*, to which it is closely related. Data are presented on the mortality of the pest and the influence of biotic factors in reducing populations. The most important of these factors is a virus disease to which the name *Bergoldia calypta* has been given.

1581. VIVANI, W. Una anormale e dannosa ramificazione apicale nelle giovani pioppelle. [**An abnormal and harmful apical ramification of young Poplar seedlings.**] In *Studie e Ricerche sulla Pioppicoltura*, Ente nazionale per la Cellulosa et per la Carta, Rome. 1953. pp. 9–19 + 2 plates. [It.]

The condition is due to the larvae of several species of *Semasia* which oviposit in the terminal buds. The parasitization of the larvae by a species of *Bracon* is described. Control can also be effected by early removal of infested shoots, which should be cut back to a healthy bud.

1582. ROSS, D. A. **Key to puparia of the Dipterous parasites of *Malacosoma* spp., in British Columbia.** *Repr.* from *Proceedings, Entomological Society of British Columbia 1952*, 49, 1953 (19–23).

1583. GÖTZE, J. *Melitaea maturna* L., der kleine Maivogel oder Eschenscheckenfalter, ein neuer Forstschädling? [***M. maturna*, a new forest pest**?] *Arch. Forstw.* 1 (3), 1952 (161–6). 5 refs. [G.]

Extensive defoliation by larvae of this (usually) univoltine species was reported on nursery stock and young regeneration of Ash on the Saxony border in Aug. 1951. The adults fly from May until July. Eggs are laid on the underside of leaves and hatch after 4–6 weeks. Except when feeding, the young larvae live in silvery silken nests, generally on young Ash but also on Aspen, Goat Willow, *Viburnum* and other low plants.

After overwintering in the litter layer they feed on ground vegetation, until pupation in May. As the Ash has put on 95% of its increment by August, and the winter buds are set, no serious damage is caused by defoliation. Collection and burning of the young larval nests is a simple and effective control. Distribution is nearly coincident with that of the Ash, with Great Britain, Denmark and the northern Mediterranean littoral excluded.

1584. SCHWENKE, W. Unsicherheitsfaktoren bei der Kiefernspannerprognose und Möglichkeiten ihrer Überwindung — mit einer Ermittlung der Nadelverbrauchsnormen und kritischen Zahlen von *Bupalus piniarius* L. und *Semiothisa liturata* Cl. [**Possible errors and means of overcoming them in forecasting *Bupalus piniarius* outbreaks—and the determination of the 'normal' needle consumption and critical population.**] *Beiträge zur Entomologie, Berlin* 2 (2/3), 1952 (189–243). 26 refs. [G.g.] I.I.E.

Discusses methods used in forecasting outbreaks of *B. piniarius* and their possibilities of error, and outlines a recommended method based on the 'normal' needle consumption and illustrated by data from studies of *B. piniarius* and *Semiothisa liturata*. [Cf. *For. Abstr.* 13 (No. 1380).]

1585. **Insect control: fall cankerworm.** *Bull. N.S. Dep. Lds. For.* No. 1 [*n.d.*] pp. [2].

Brief notes on life history and control of *Alsophila pometaria*.

1586. SMITH, C. C. **Control of the winter moth [*Operophtera brumata*] on shade trees.** *For. Biol. procd. Publ. Dep. Agric. Can.* No. 3, 1953. pp. 3.

1587. NAGY, B., REICHART, G., and UBRIZSY, G. Der amerikanische weisse Bärenspinner, *Hyphantria cunea* Drury, in Ungarn. [***H. cunea* in Hungary.**] *NachrBl. dtsch. PflSch Dienst.* 7 (10), 1953 (191–5). 13 refs. [G.]

Notes on *H. cunea*, which was introduced into Hungary about 1940, and is now widespread throughout the country. Its primary hosts there are *Morus alba*, *M. nigra* and *Acer negundo*, though it also has a very wide range of secondary hosts. The original parasites of this species were not introduced with it, but a large number of native parasites have become adapted to it. Mechanical control measures combined with 0·8–1% DDT oil-emulsion sprays have given good control.

1588. PETRIK, C. Der weisse Bärenspinner in Jugoslavien. [***Hyphantria cunea* in Jugoslavia.**] *Anz. Schädlingsk.* 26 (10), 1953 (149–50). 8 refs. [G.]

Spread of the pest in Jugoslavia since 1949, description of the insect and its habits, and chemical control operations with DDT and BHC begun in 1951. [Cf. *For. Abstr.* 14 (No. 1458).]

1589. SCHWARTZ, R. Die Ausbreitung des weissen Bärenspinners (*Hyphantria cunea* Drury) in Jugoslawien in den Jahren 1949 bis 1952. [**The spread of *H. cunea* in Jugoslavia in the years 1949–1952.**] *NachrBl. dtsch. PflSch Dienst.* 7 (10), 1953 (198–9). 8 refs. [G.]

1590. VAGO, C. Sur une virose du type 'polyedrie' particulière à la processionnaire du chêne: '*Thaumetopoea processionea* L.' Lepidoptera. [**A polyhedral virus disease peculiar to *T. processionea*.**] *Rev. for. franç.* 5 (10), 1953 (654–6). 9 refs. [F.]

The disease has been found in insects in the Paris area. It appears to be a contagious disease with latent and acute phases, with resistant inclusion bodies and a capacity for both epizootic and enzootic spread.

Coleoptera

See also Nos. 1068, 1073–4, 1572, 1963, 1979 *et seq.*

1591. RUMMUKAINEN, U. Weiteres über das Auftreten des Laubholzbohrers, *Hylecoetus dermestoides* L. (Col., Lymexylonidae), an Birken. [**Further information about the occurrence of *H. dermestoides* on Birch.**] *Annales Entomologici Fennici, Helsinki* 15 (3), 1949 (131–5). 5 refs. [G.] I.I.E.

Further observations made in the Padasjoki district. [Cf. *For. Abstr.* 12 (No. 2398).]

1592. Woo, W.-C. **Studies on the bionomics of the Chinese Elm beetle, *Galerucella aenescens* Fairm. (Coleoptera: Chrysomelidae).** *Peking Natural History Bulletin, Peking* 19 (1), 1950 (22–38). 4 refs. I.I.E.

G. aenescens is the most important pest of Elms (particularly *Ulmus pumila* and *U. macrocarpa*) in Hopei Province. Detailed information is presented on its life history and habits. Mechanical control is best carried out in June during the prepupal and pupal stages. The pupae can be swept off the trunks and killed by sprinkling with hot water, or by insecticides. Insecticidal sprays may also be used when the overwintering beetles appear on the Elms in April.

1593. Gardner, J. C. M., and Evans, J. O.; Pudden, H. H. C. **Notes on *Oemida gahani* Distant (Cerambycidae).** *E. Afr. agric. J.* 18 (4), 1953 (176–83). 5 refs.

O. gahani, which is ubiquitous in the Kenya highlands, is a beetle which, in its larval stage, can cause serious damage not only to seasoned wood but also to certain species of trees in plantations. In living trees, the site of oviposition is dead wood caused by pruning operations or scars caused by wild game. The exotic *Cupressus* species now extensively planted in Kenya are particularly susceptible, and the custom of pruning them for timber quality greatly increases the risk of attack. Notes are given on life history, distribution and control measures. Comparisons of wound area and occlusion rates are now being made between annual and biennial prunings, to various fractional heights, starting with crops of ages 2 and 3.

1594. Kamp, J. Der Lärchenbock. Ein für Württemberg neuer Holzschädling. [***Tetropium gabrieli*, a new wood pest in Württemberg.**] *Holz-Zbl.* 77 (3), 1951 (15). 5 refs. [G.]

Describes the beetle, which has become an increasingly serious pest there since 1948.

1595. Frappa, C. Sur l'introduction et l'acclimatement à Madagascar d'*Anaphoidea nitens* Gir., insecte auxiliaire parasite du charançon de l'*Eucalyptus*. **[The introduction and acclimatization in Madagascar of *A. nitens*, parasite of *Gonipterus scutellatus*.]** *Bulletin Agricole, Tananarive* 2 (17), 1949 (14–9). 2 refs. [F.] I.I.E.

Cf. *For. Abstr.* 14 (No. 506).

1596. Palm, T. Anmärkningar till några svenska *Pissodes*-arter (Col., Curculionidae). **[Some Swedish *Pissodes* spp.]** *Entomologisk Tidskrift, Stockholm* 74 (3), 1953 (121–3). [Sw.] O.R.S.

Considerable damage to self-sown Scots Pine and Norway Spruce in S. Arvidsjaur was caused by *P. pini* and *P. gyllenhali*. A few examples of *P. notatus* and *P. validirostris* on Pine and of *P. harcyniae* on Spruce were also noted. Identification of these species is discussed.

1597. Martínek, V. Jak využít dravého a cizopasného hmyzu v boji proti smrkovým kůrovcům. **[Use of insect predators and parasites in the control of Spruce barkbeetles.]** *Lesn. Práce* 31 (8), 1953 (366–74). [Cz.]

Lists insects preying on *Ips typographus*, *I. amitinus*, *Pityogenes chalcographus*, *Polygraphus polygraphus*, *P. subopacus*, *Pityophthorus pityographus*, *Xyloterus lineatus*, and *Dendroctonus micans*, as well as insects suspected of preying on *Ips typographus* and *I. amitinus*.

1598. Jamnický, J. Prirodzení nepriatelia kôrovca *Ips typographus* L., ich vyznam a ich možnost' využitia v boji proti kôrovcovi. **[Natural enemies of *I. typographus*, their significance and the possibility of using them for its control.]** *Pol'ana* 9 (6; 7/8; 9), 1953 (128–30; 166–70; 203–7). [Slovak.]

Describes its coleopterous and hymenopterous enemies with an identification key.

1599. Sachtleben, H. Die parasitischen Hymenopteren des Fichtenborkenkäfers *Ips typographus* L. **[The hymenopterous parasites of *I. typographus*.]** *Beiträge zur Entomologie, Berlin* 2 (2/3), 1952 (137–89). Many refs. [G.] I.I.E.

A review of all known data.

1600. **Engelmann-Spruce barkbeetle.** *Rep. B.C. Dep. Lds. For. 1952*, 1953 (60).

A bionomic study of *Dendroctonus engelmanni* showed that it has a 2-year life cycle. Present indications are that: (1) trees over 20 in. d.b.h., and (2) rapidly tapering trees are a high risk; (3) windfalls are more attractive to beetles than slash and usually remain attractive for 2 seasons compared with one for slash; (4) outbreaks of beetle may occur when logging operations are moved abruptly or shut down, causing a break in the supply of slash; (5) outbreaks may be severe in pockets of virgin timber left unexploited because of unfavourable logging conditions.

1601. Massey, C. L., Chisholm, R. D., and Wygant, N. D. **Ethylene dibromide for control of Black Hills beetle.** *J. econ. Ent.* 46 (4), 1953 (601–4). 2 refs.

During 1949 and 1950 several hundred standing *Pinus ponderosa* trees were sprayed with different fumigants in emulsions and in solutions. They included commercial grades of dichloroethyl ether, $C_2H_4Br_2$, nitrobenzene, *o*-dichlorobenzene, and *o*-nitrochlorobenzene. They were dissolved in No. 1 fuel oil, heavy aromatic naphtha (flash point 110° F.), Solvesso 100 (flash point 121° F.), and Stanisol. One series of applications was made in May against the larval stages of *Dendroctonus ponderosae* and a second series in late June or early July against the pupal and adult stages. $C_2H_4Br_2$ was the only effective fumigant tested in the emulsion. The following formula is recommended for treatment at all stages: $C_2H_4Br_2$ 2 lb., emulsifier 8 oz., No. 1 fuel oil to make 1 gal. One gal. of the concentrate should be mixed with 4 gal. water to make 5 gal. emulsion. $C_2H_4Br_2$ may also be used effectively in an oil solution at the rate of 1·5 lb./5 gal.

1602. Kamp, H. J. Ein neuer Holzschädling in Deutschland. Der 'schwarze Nutzholzborkenkäfer'. **[A new wood pest in Germany: *Xylosandrus germanus*.]** *Holz-Zbl.* 79 (23), 1953 (242). 3 refs. [G.]

Reports the appearance of *X. germanus* south of Stuttgart in Aug., 1952. [Cf. *For. Abstr.* 14 (No. 2491).]

1603. KAMP, H. J. Neues über den eingeschleppten 'schwarzen Nutzholzborkenkäfer'. **[Recent information on *Xylosandrus germanus*.]** *Holz-Zbl.* 79 (111), 1953 (1194). 4 refs. [G.]

Gives detailed information on its biology, damage, incidence and control. [Cf. *For. Abstr.* 14 (No. 2491).]

1604. REGNIER, R., HURPIN, B., and MAILLARD, J. Peut-on prévoir l'importance et la date des grandes sorties printanières des hannetons? Quand doit-on traiter? **[Is it possible to predict the intensity and the date of the main spring emergences of *Melolontha melolontha*? When should control measures begin?]** *C.R. Acad. Agric. France* 39 (11), 1953 (573–9). [F.] A.P.B.

Methods of sampling to estimate (1) numbers of larvae in the soil and (2) the progress and intensity of emergence, and how to judge when control measures should begin.

1605. CAIRASCHI, E. A., BRÊME, HARRANGER, and KUCHLY. Les enseignements de l'opération hannetons de Rambervillers (Vosges) (avril–mai 1953). **[Cockchafer control operations in the Rambervillers region (Vosges)—April–May 1953.]** *C.R. Acad. Agric. France* 39 (11), 1953 (584–7). [F.] A.P.B.

Details and results of successful operations with BHC (powders and emulsions).

Hymenoptera

1606. ELENS, A. A. Étude écologique des lophyres en Campine (Belgique). I. Résistance à la dessiccation des éonymphes de *Diprion pini* L., *D. pallidum* Kl. et *D. sertifer* Geoffr. II. Incubation des oeufs et adaptation à la température chez *Diprion pini* L., *D. pallidum* Kl. et *D. sertifer* Geoffr. **[Ecological study of sawflies in Campine (Belgium). I. Resistance to desiccation of pupae of *Diprion pini*, *D. pallidum* and *D. sertifer*. II. Incubation of eggs and adaptation to temperature.]** *Agricultura, Louvain (Ser. 2)* 1 (1), 1953 (3–32). 33 refs. [F.f.flem.e.g.] H.S.B.

(I) Pupae of these 3 species, with their cocoons, were placed in containers and kept at 5 different levels of humidity, a check being kept on their % loss in weight. Rates of loss were higher as the humidities decreased. *D. sertifer* was the most resistant to desiccation and *D. pallidum* the least. Weight losses of *D. sertifer* and *D. pini* are smaller at lower, and greater at higher humidities than would be expected on the basis of the rule of proportionality. The high resistance of *Diprion* spp. in general, compared with other genera, seems attributable, at least in part, to protection afforded by the cocoon.

(II) Rates of incubation were compared in eggs of these 3 species by keeping them at different temperatures. Incubation took place in the following order: *D. sertifer*, *D. pallidum* and *D. pini*. *D. sertifer* has a more extensive and northerly range than *D. pini*. The range of *D. pallidum* is not known. A high rate of incubation seems to be correlated with adaptation to a colder environment. Comparison with data from Bavaria shows a racial divergence in *D. pini*, the more northerly race from Campine being less independent of temperature changes.

1607. BIRD, F. T. **The effect of metamorphosis on the multiplication of an insect virus.** *Repr.* from *Canad. J. Zool.* 31, 1953 (300–3 + 10 photos). 7 refs.

The pre-pupal stage of the European Spruce sawfly [*Gilpinia hercyniae*] is immune to infection by a polyhedral virus disease. The virus multiplies only in the nuclei of the digestive cells of the mid-gut epithelium and during metamorphosis these are replaced by embryonic cells not susceptible to infection although they develop into digestive cells eventually. The pre-pupal mid-gut, a temporary gut, is composed entirely of embryonic cells. New digestive cells appear later in the pupal and adult stages and these rapidly become infected by the virus. *Author's summary.*

1608. REEKS, W. A. **The establishment of introduced parasites of the European Spruce sawfly (*Diprion hercyniae* Htg.) (Hymenoptera: Diprionidae) in the Maritime Provinces.** *Canad. J. agric. Sci.* 33 (5), 1953 (405–29). 35 refs. O.R.E.

A report on the status of introduced parasites in the Maritime provinces and in 2 areas in Quebec after the *Gilpinia hercyniae* outbreak. Notes are given on the establishment, survival, distribution and spread of 7 species. *Dahlbominus fuscipennis* was the only cocoon parasite to be taken in large numbers. Five species of larval parasite were recovered, including 4 species of *Exenterus* and a tachinid parasite *Drino bohemica*. In conditions of high host density *D. fuscipennis* and *E. claripennis* were the most effective species. *Drino bohemica* and *E. vellicatus* were more effective at lower densities, but may be effective at high host densities if they have time enough to multiply before the sawfly population peak. The species which established themselves most rapidly were *D. fuscipennis*, *E. claripennis* and *E. amictorius*. [Cf. *For. Abstr.* 14 (No. 516).]

1609. ***Gilpinia hercyniae* (Htg.) (European Spruce sawfly).** *Distr. Maps Insect Pests (Ser. A)* No. 35, 1953. pp. [2].

1610. ***Gilpinia polytoma* (Htg.).** *Distr. Maps Insect Pests (Ser. A)* No. 34, 1953. pp. [2].

1611. DAVIAULT, L. La tenthrède de Leconte (*Neodiprion lecontei* Fitch) dans la province de Québec. **[*Neodiprion lecontei* in the province of Quebec.]** *Rep. Quebec Soc. Prot. Pl. 1950–51* [1953?] (165–84). 6 refs. [F.]

Life history, habits, parasites and predators, and population trends.

1612. BENJAMIN, D. M., and UNDERWOOD, N. B. **Swaine Jack Pine sawfly in Wisconsin.** *J. econ. Ent.* 46 (4), 1953 (703). 1 ref.

Reports *Neodiprion swainei* on *Pinus banksiana* in the Sauk County Forest, Wisconsin in 1952. This is the first report of the species in Wisconsin and an extension of its range to the south.

1613. HUSSEY, N. W. **Research on the *Megastigmus* insects infesting conifer seeds.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (127–8).

Includes notes on the life history and natural control of *M. spermotrophus*. [Cf. *For. Abstr.* 13 (No. 4064).]

1614. HOUGH, J. S. **Studies on the common spangle gall of Oak. II. A general consideration of past work on gall induction.** *New Phytol.* 52 (3), 1953 (218–28). 55 refs. O.R.S.

Cf. *For. Abstr.* 14 (No. 3574).

1615. HOUGH, J. S. **Studies on the common spangle gall of Oak. III. The importance of the stage in laminar extension of the host leaf.** *New Phytol.* 52 (3), 1953 (229–37). 16 refs. O.R.S.

(1) The uneven distribution of spangle galls is shown to have correlation with the variation in stage of development of Oak leaves on different trees and even on the same tree. (2) The developmental history of the Oak leaf is described in relation to gall initiation. (3) There is a close correlation between extension rates of various parts of the lamina and subsequent degree of galling in these parts. (4) Extension rates of adjacent leaves, one of which is utilized by gall wasps, the other not, are shown to differ. (5) The question of measurement of 'physiological age' of leaves is briefly discussed. Probably rate of lamina extension may be taken as a rough indication of 'physiological age'. *Author's summary.*

Diptera

1616. SCHREED, J. C. **Control of the Andromeda lace bug [*Stephanitis globulifera*] and the Holly leaf miner [*Phytomyza ilicis*].** *Bull. Conn. agric. Exp. Sta.* No. 568, 1953. pp. 13. 5 refs.

459. *Other Animals*

See also Nos. 1492–3.

1617. HENRY, B. W. **Effects of ethylene dibromide on nematodes associated with a root rot of Southern Pine seedlings.** *Abstr.* in *Phytopathology* 43 (9), 1953 (474–5).

Nematode populations in the nursery beds consisted of *Acrobeloides* spp., *Tylenchus* sp., *Ditylenchus* sp., *Aphelenchoides* sp., *Panagrolaimus* sp., *Diplogaster* sp., *Pratylenchus* sp., *Zeldia* sp., *Discolaimus* sp., and *Dorylaimus* sp. Three weeks after treatment with $C_2H_4Br_2$ no nematodes were found in the beds, which were then sown. Four weeks later very few were found, but five weeks after sowing the population equalled, and 8 weeks after was tenfold that of control beds. Twenty weeks after sowing it had declined to 1·5 times that of controls. The increase in the treated beds, however, consisted entirely of *Acrobeloides* spp. which are not considered pathogenic. Root rot was severe in untreated, and very light in the treated beds.

1618. ***Paratetranychus pilosus* (C. & F.) (*Metatetranychus ulmi* auct.). Fruit tree red spider mite, European red mite.** *Distr. Maps Insect Pests* (*Ser. A*) No. 31, 1953. pp. [2].

1619. ATCHESON, W. C. **An ecological study of three species of mites on American Linden.** *J. econ. Ent.* 46 (4), 1953 (705). 5 refs.

Notes on *Typhlodromus* sp., *Czenspinskia lordi* and *Tetranychus canadensis* found in association with *Therioaphis tilia* on *Tilia americana* in Maryland.

46. DAMAGE TO TREE GROWTH BY MAN

See Nos. 1201–2.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

See also Nos. 1267, 2175.

1620. CAMPANA, R. J. ***Corticium galactinum* and White Pine needle blight.** *Abstr.* in *Phytopathology* 43 (9), 1953 (468).

Inoculation experiments produced no evidence to suggest that *C. galactinum* is the cause of White Pine needle blight.

1621. HUBERT, E. E. **Studies of *Leptographium* isolated from Western White Pine.** *Phytopathology* 43 (11), 1953 (637–41). 11 refs.

Inoculation experiments were made with *Leptographium* spp. developing on *Pinus monticola* showing symptoms of pole blight. The organism, a wound parasite, produces lesions in the bark of the host. It also causes the death of seedlings under certain conditions. The production of phytotoxins was established, but the tests indicated that *Leptographium* sp. is not the primary cause of death in trees suffering from pole blight. [Cf. *For. Abstr.* 14 (No. 3581).]

1622. HAWBOLDT, L. S. **'Dieback' of Yellow Birch.** *Bull. N.S. Dep. Lds. For.* No. 4, 1951. pp. 8.

A review of results of research on dieback of *Betula lutea*, with some account of the present situation in Nova Scotia.

1623. HAWBOLDT, L. S. **Climate and Birch 'dieback'.** *Bull. N.S. Dep. Lds. For.* No. 6, 1952. pp. 37. 68 refs.

Reviews the literature on the subject, with particular reference to climatic changes in N. America in recent years which are possibly responsible for the decadence of *Betula lutea*, notably the precipitation deficit in the Maritimes from ca. 1910 to 1940.

1624. GREENIDGE, K. H. **Further studies of Birch dieback in Nova Scotia.** *Canad. J. Bot.* 31 (5), 1953 (548–59). 5 refs. O.R.S.

Well marked differences, involving both the patterns of moisture movement and storage, have been found to separate the water relationships of Yellow Birch (*Betula lutea*), in various stages of deterioration. The cumulative results of injection studies, root excavations and an extended survey of the trends in moisture distribution in the species over a prolonged period, suggest that the locus of action of the disease is, in the first instance, in the roots and that excessive rootlet mortalities in apparently healthy trees constitute the initial indication of a diseased condition in the species. [Cf. *For. Abstr.* 14 (No. 2506).] *From author's summary.*

1625. BURO, A. Bericht über die Erkrankung der Markstrahlen des Rotbuchenholzes. **[A disease of the medullary rays of Beech.]** *Arch. Forstw.* 1 (3), 1952 (167–72).[G.]

A hitherto unknown disease is described and illustrated in macro- and microscopic detail from dead material. The seat of the disease is in the living ray cambium (growth rings were bowed outwards between the rays, and the distal ends of the rays were deeply indented with corresponding projections into them from the bark). It was not possible to identify a fungal pathogen by inoculation.

1626. **Silviculture [of Black Wattle].** *Rep. Wattle Res. Inst. S. Afr. 1952/53*, 1953 (17–21). 3 refs.

Thinning trials show that the growth rates of dominants are unaffected by densities of 450–1100/acre at 2 years. At 2½ years 750/acre is critical, while at 4 years plots at 650/acre showed significant suppression compared with those at 500/acre. Four treatments, varing the time interval and number of thinnings, to give a final density of 500/acre at 35 ft. mean height, had no effect on the incidence of gummosis; but split-plot treatments of (1) no weeding, Wattle regrowth hand-pulled while very small, (2) weeds and Wattle regrowth both hand-pulled, (3) weeds and Wattle regrowth removed by hoeing, gave highly significant increases in the % of the disease for (2) and (3). These results suggest that gummosis may be considerably reduced by weeding only in the early stages to remove smothering growths and that diameter increment is not seriously affected by failure to remove weeds until the canopy has closed, but that delayed thinnings in the early stages depress diameter increment.

1627. Nutman, F. J., and Roberts, F. M. **Investigations into diseases of the Clove tree in Zanzibar.** *E. Afr. agric. J.* 18 (4), 1953 (146–54). 21 refs.

A documented account of the investigation (or non-investigation) of sudden-death and dieback of Cloves in Zanzibar from 1907 to the present day, by two officers of the Clove Research Scheme.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

See also No. 1027.

1628. Meyer, H. A. **Forest mensuration.** Penns Valley Publishing, Inc., State College, Pa. 1953. pp. viii + 357. Price $6·50 (£2. 12*s.*).

An elementary textbook of American methods.

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

522. *Height, Length*

1629. Todorović, D. Greška pri mereuju visina drveća kada se horizontalna proekcija vrha stabla i centar nultog preseka stabla ne poklapaju. **[Error in measuring tree height when the projection of its top does not coincide with the centre of the butt section.]** *Godišn. šum. nauč. opit. Inst., Skopje* No. 1, 1951 (33–74). 3 refs. [Serb.e.]

Develops several formulae for evaluating the errors involved, irrespective of the type of hypsometer used, when the distance between the observer and the centre of the butt differs from that between the observer and the vertical projection of the tree-top. Recommends measuring the height from a distance not less than double the tree-height.

1630. Skadsheim, M. Instrumenter for måling av trehøyder. **[Instruments for measuring tree heights.]** *Tidsskr. Skogbr.* 61 (7/8), 1953 (290–6). 4 refs. [Nor.]

Height estimates were made on a number of trees by several operators using the Christen hypsometer, the Blume-Leiss hypsometer incorporating a sighting tube and a pendulum with fixing device for determining the height above and below a point at eye level, and the JAL hypsometer, a Danish instrument described in *Dansk Skovforen. Tidsskr.* 37 (12), 1952 (590–601) [consisting of a scale mounted on a stand], and results were compared for accuracy with measurements made on the trees after felling. A statistical analysis of the results shows that the Blume-Leiss and the JAL are both more accurate than the Christen hypsometer. The Christen and the JAL both call for the use of a heavy pole, and the JAL is itself heavy, while the Blume-Leiss is compact and light. The Blume-Leiss, moreover, does not need two men as the others do. The tree height can be determined in a single reading with the Christen and the JAL, but with the Blume-Leiss two figures have to be added and sloping ground requires a correction factor.

1631. Soest, J. van, and Tiemens, F. De hoogtemeter van Blume-Leiss. **[The Blume-Leiss hypsometer.]** *Ned. Boschb.-Tijdschr.* 25 (10), 1953 (279–82). [Du.]

Tests made by the Bosbouwproefstation T.N.O. on this hypsometer showed that both the distance finder and the actual height-measurement device of the instrument tested gave sufficiently accurate results, and that in favourable conditions 40–50 trees/hr. could be measured by a man with one assistant. Results are tabulated.

1632. Emrović, B. O upotrebi standardnih visinskih krivulja. **[Use of standard height curves.]** *Šum. List* 77 (2), 1953 (78–94). 16 refs. [Croat.g.]

For selection forest, in which the height curve should not materially change with time, it may be taken that the parameter α of Henriksen's equation [see *For. Abstr.* 13 (No. 1417)] is constant, and this equation can then readily be transformed into $h = \alpha \log (d/B)$ or $\log h = \log \alpha + \log (\log \frac{d}{B})$, where B is a new empirical constant. A special slide rule can be constructed on the basis of this equation, for readings of h values without knowledge of α, provided that d and h are known for a mean tree. It is also possible to derive analogous logarithmic relationships from standard height curves constructed by graphical methods. This is done for Silver Fir, and a nomogram based on Schuberg's volume tables (*Formzahlen und Massentafeln für die*

Weisstanne, Berlin, 1891) is presented in which these correlations can be related to basal area and form factor to give the volume of any particular diameter class. Volume estimates obtained with this nomogram for two sample plots, showed sufficient accuracy for practical purposes.

524. *Determination of the Volume of Trees and Stands*

524.1. Principles of Volume Determination. Form (Taper)

See also Nos. 1252, 1646.

1633. Milojković, D. T. Istraživanja oblika i zapremine belog jasena (*Fraxinus excelsior* L.) u Ravnom Sremu. **[Investigations on the form and volume of *F. excelsior* in the Srem plain.]** *Glasn. šum. Fak., Beograd* No. 6, 1953 (127–94). 20 refs. [Serb.serb.f.]

Tabulates and graphs the results of investigations in 1951–2 on 1137 felled trees. *F. excelsior* attains, in the area investigated, a height of 36 m. and d.b.h. of 70 cm. or more at 100 years. Root development is very characteristic, as is the considerable taper near ground level (above a height of 3 m. the taper is very small). The average (Schiffel) form quotient is 0·626 (scatter 0·47–0·86, coefficient of variation ± 10·98%) and it increases if Ash is in mixture with *Quercus robur*. The volume and form factor are low, owing to the development of the butt, the difference between the form quotient and the form factor being, on the average, 0·222. The branch % increases with d.b.h., and decreases with increasing height. The volume ratio of bark decreases as d.b.h. increases.

1634. Setten, G. G. K. **The incidence of buttressing among Malayan tree species when of commercial size.** *Malay. Forester* 16 (4), 1953 (219–21).

Of 18,067 trees of all species, measured in the course of marking, 40·7% had buttresses more than 4 ft. 6 in. high. The % varied considerably with species, from 87·8% for *Intsia palembanica* to 0·8% for *Calophyllum* spp. The number of trees measured and % with buttresses of 4 ft. 6 in. and over are given for some 50 species. Only those species are included for which measurements of at least 50 different trees were available.

524.3. Volume of Tree Groups and Stands

1635. Šurić, S. Tabele masa v. Laer-Spiecker. **[Von Laer and Spiecker's volume tables.]** *Šum. List* 77 (2), 1953 (66–77). [Croat.g.]

The author appraises these volume tables [see *For. Abstr.* 13 (No. 3204)], and demonstrates that they cannot be applied to selection forests or old unthinned stands. Owing to a difference in the shape of the height curve which forms the basis for von Laer and Spiecker's 'volume series' and 'form-height series', these series differ considerably from those suggested by the author. The former give, for the small-diameter stems much higher, and for the large-diameter stems much lower, volume and form-height values than those actually found in the Croatian forests. The author believes that the number of series should be reduced and stem excentricities allowed for.

1636. Klepac, D. Uređajne tablice. **[Management volume tables ('tariffs').]** *Šum. List* 77 (4/5), 1953 (192–206). 18 refs. [Croat.f.]

Discusses and illustrates the use of several volume 'tariffs' for selection forest management, with special reference to those of Algan and Schaeffer.

1637. Potts, S. M. **Volume tables for small-diameter Loblolly [*Pinus taeda*] and Shortleaf [*P. echinata*] Pines.** *Tech. Note Tenn. Vall. Auth.* No. 10, 1952. pp. 23. 17 refs.

Form-class tables based on ca. 800 planted and natural trees in 10 southern states.

1638. Cancio Morenza, G. **Volume tables from sample trees of *Pinus insignis* Doug. in the north of Spain.** *Transl. For. Timb. Bur. Aust.* 1952. pp. 8. Transl. by D. A. N. Cromer from [*Bol.*] *Inst. for. Invest. Exp. Madrid* 22 (59), 1952. [Cf. *For. Abstr.* 13 (No. 3207).] Limited distribution.

1639. Hummel, F. C. **Use of the 'volume/basal-area line' for determining standing crop volumes.** *Rep. For. Res. For. Comm., Lond. 1951/52*, 1953 (80).

A study of the relationship between the volume of trees in a stand and their sectional areas at breast height has produced results which may be of practical use in forest enumerations. It has long been known that in a coniferous stand this relationship is usually linear. Examination of the permanent-sample-plot records has shown that the point where the line intersects the x axis (abscissa of the graph) remains more or less constant at 0·03 sq. ft., although the slope of the line increases with age. A table was prepared giving for every quarter-inch girth class the volumes as read from a series of these lines, all going through the common point on the x axis and having vertical intervals equivalent to 1 Hoppus ft. at a basal area of 1 sq. ft. If the volumes of a limited number of sample trees in a stand are known, it is possible to determine which column in the table best fits the data, and this column may then be used as a local volume table. The main advantages claimed for this method of volume determination are that: (1) there is no need to determine the mean girth of the stand before selecting the sample trees; (2) the sample trees need not be of specified girth, provided they reasonably cover the range of girth in the stand; (3) not only an estimate of the total volume, but its distribution by girth classes is obtained. Practical details of application of the method in the field are being investigated.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also Nos. 1207, 1339–40.

1640. Palley, M. N. **The Saskatchewan forest inventory.** *For. Chron.* 29 (3), 1953 (261–6). 5 refs.

The means employed in arriving at a land classification, timber estimate, growth forecast, and forest map are described. Man-day requirements for

individual inventory operations, and sampling errors, are cited.

1641. CARSON, G. L. **The 'spot' method of enumeration survey in Matang Mangroves.** *Malay. Forester* 16 (4), 1953 (206–12).

The method employed in Matang consists in the enumeration of the growing stock in circular areas or 'spots' of $\frac{1}{50}$ acre spaced 1 chain apart in lines 5 chains apart, giving a 4% enumeration. The details of the procedure are described. The advantages and disadvantages of the method compared with strip sampling are discussed. Figures are given for an example in which the over-all error was only −2·9%.

1642. CLARK, M. B. **Relative efficiency of some specific plot-sizes in estimating timber volumes in some specific timber types.** *For. Chron.* 29 (3), 1953 (254–60). 5 refs. (*Tech. Publ. B.C. For. Serv.* T.40.)

Illustrates the methods and results of making tests of the comparative efficiency of some plot sizes in inventory work. The results showed that $\frac{1}{10}$-acre are more efficient than $\frac{1}{5}$-acre plots in inventories of 100- to 120-year-old Douglas Fir stands; $\frac{1}{10}$-acre are more efficient than $\frac{1}{40}$-acre plots in 50-year-old Western Hemlock [*Tsuga heterophylla*] stands; $\frac{1}{5}$-acre are more efficient than $\frac{1}{10}$-acre in mature uneven-aged Spruce/Balsam Fir; $\frac{1}{4}$-acre are more efficient than either $\frac{1}{20}$- or $\frac{1}{2}$-acre plots in 50-year-old Douglas Fir stands. In addition to these tests in well-stocked stands, an inventory of a thinned stand of 50-year-old Douglas Fir showed that $\frac{1}{2}$-acre are more efficient than $\frac{1}{4}$-acre plots. *From author's summary.*

525. *Volume by Assortments. Merchantable Volume*

See also Nos. 1495–8, 1503.

1643. BENNETT, F. A. **Topwood volume tables for Slash and Longleaf Pines.** *Res. Note Stheast. For. Exp. Sta.* No. 42, 1953. pp. 2.

Rough cordwood volume tables are given for smallwood, from Longleaf and Slash Pine of 9 to 18 in. d.b.h. having 1 to $3\frac{1}{2}$ sixteen-foot logs. Separate tables are given for tapped and untapped trees of each species. In gathering the data all volume beyond an 8-in. top o.b. and down to 4-in. u.b. was considered cordwood.

1644. ALLEN, J. C., and CUMMINGS, W. H. **Tree volume equivalents for small Pines.** *Tech. Note Tenn. Vall. Auth.* No. 13, 1953. pp. 5 + 4 tbls.

Assortment volume tables for use when cutting fence posts and poles from young stands of *Pinus taeda* and *P. echinata.*

1645. CANTIANI, M. Tavola dendrometrica dei cedui di cerro del Molise. [**Assortment volume tables for the *Quercus cerris* coppice of Molise.**] *Ital. for. mont.* 8 (5), 1953 (233–9). [It.it.f.]

1646. ALTHERR, E. Genaue Sortimentierung und Bewertung von Nadelholzbeständen mit Hilfe 'echter' Ausbauchungsreihen. [**Accurate determination of assortments and evaluation of coniferous stands with the aid of 'true' [Hohenadl] diameter-quotient series.**] *Forstwiss. Cbl.* 72 (7/8), 1953 (193–210). 11 refs. [G.g.]

The existing German assortment tables are constructed with d.b.h. and height as the only variables, i.e. they take no account of variations in stem form and are valid only for stands of 'average' form. The author briefly discusses the separate and combined effects of d.b.h., tree height, stem form and root swelling upon the assortments (timber and cordwood) that can be cut from a stem, using Hohenadl's true stem form factor $\lambda_{0\cdot9}$ and root-swelling form quotient q_H as adopted in works by Krenn and Prodan [see *For. Abstr.* 12 (No. 803); 13 (No. 1414)]. He then shows how, knowing the mean Hohenadl form class (expressed by the 'true' diameter-quotient series $\eta_{0\cdot9}$ to $\eta_{0\cdot1}$), the actual curves of stem form may be calculated and graphically represented for a stand, with height and diameter as the co-ordinates, enabling the diameter at any height up the stem to be read off directly for any particular d.b.h.

In order to eliminate much of the calculation involved (multiplications of the actual $d_{0\cdot9}$ values by the quotients $\eta_{0\cdot9}$ to $\eta_{0\cdot1}$, and of the relative heights up the stem by the appropriate factors), the author has devised a 'two-dimensional slide rule' which performs the multiplications by means of logarithmic scales. This instrument, the construction and use of which are illustrated, consists of (*a*) a background of double-logarithmic graph paper with scales for the actual (absolute) values of height (ordinate) and diameter (abscissa); and (*b*) a transparent (e.g. celluloid) overlay, movable only in directions ‖ to the two axes of (*a*). On (*b*) the curve of the appropriate diameter-quotient series is plotted to the same logarithmic scale, with relative height and relative diameter as ordinate and abscissa respectively. Now by setting (*b*) so that the points for $d_{0\cdot9}$ and tree height are in line with the known actual values, all the remaining values can be obtained by reading from the appropriate point on the relative form curve to the corresponding points on the actual height and diameter axes. Thus e.g. the height to a given top diameter is obtained by reading from that diameter on the 'actual' scale to the corresponding point on the relative curve, and from the latter to the 'actual' height scale. Since the quotients $\eta_{0\cdot9}$–$\eta_{0\cdot1}$ are based on o.b. and German regulations on assortments on u.b. measurements, a graph giving double bark thickness in relation to diameter class and height up the stem is also needed for the calculations. To get sufficient accuracy of reading, the 'slide rule' must be 'about the size of a small drawing board'. The possible construction of assortment tables taking adequate account of stem form is briefly discussed as a basis for further research.

Finally the accuracy of the new procedure is illustrated in a statistical comparison of the actual felled volumes per tree with the calculated volumes for the same stand. Results are satisfactory.

1647. MAYER-WEGELIN, H. Der Einfluss von Schaftform und Holzfehlern auf den Wert des Buchenstammes. [**Effect of stem form and wood defects on the value of the Beech stem.**] *Holz Roh- u. Werkstoff* 11 (9), 1953 (342–9). 14 refs. [G.g.] P.R.

Gives the results of price calculations based on an assortment table compiled by the author from assortment cutting trials made some years ago on

ca. 260 representative Beech stems, 12–50 cm. in diam., from stands of site quality III in the Bramwald. The table distinguishes 8 stem-quality classes based on form and wood defects, and 7 assortments from grade-I timber down to small branchwood. Results (tabulated) show that, as compared with average, normally grown stems, free of defect, the value of highly cylindrical stems may be up to 20% higher, and that of very tapering stems up to 20% lower. Crookedness can lower the value of an otherwise faultless stem far more than forking. Knottiness—which can be estimated from the distribution of large branch scars on the bole—or other serious defects, may reduce the value to less than 50% of that for a normally grown, faultless stem of the same diameter.

526. *Log Measurement. Scaling*

See also No. 1865.

1648. Enhetlig mätning av sågtimmer. **[Standardized measurement of sawtimber.]** *Skogen* 40 (10), 1953 (220). [Sw.]

Discusses the new regulations for standardizing measurement of volume (based on the measurement of top and butt diameter in northern, and on top diameter in central and southern Sweden) and determination of quality.

1649. Enhetlig mätning av massaved. **[Standardized measurement of pulpwood.]** *Skogen* 40 (11), 1953 (240–1). [Sw.]

Discusses new regulations standardizing the measurement of pulpwood (both stacked and solid volumes) in Sweden.

527. *Solid Volume of Stacked Products*

See also Nos. 1649, 1994.

1650. Lahti, T. Paperipuun nippukuution määrittämisestä. **[The measurement of the contents of pulpwood bundles.]** *Metsät. Aikak.* 1953 (5), (148–52). [Fi.e.]

Sampling to determine the size of an average bundle in a recent pulpwood-floating operation was found laborious and costly. A method was developed for calculating the cubic contents of a bundle by multiplying the area of its cross-section by the timber length. Two methods were used for measuring the cross-section: (1) taking the vertical and horizontal diameters of floating bundles; or (2) measuring the circumference of suspended bundles on land. The density of the bundles was found to depend on the length and straightness of the wood, and it was therefore necessary to classify the bundles and to obtain the average bundle density for each class. In this way a reasonably accurate estimate of the real cubic content was obtained fairly easily. *From author's summary.*

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

See also No. 1657.

1651. Suchecki, K. Rozwinięcie teorii ekologicznego wypełnienia przestrzeni i zastosowania jej w hodowli lasu. **[Development of the theory of the ecological occupation of space and its application in silviculture.]** *Prace rol.-leśn. polsk. Akad. Um.* No. 67, 1953. pp. 97. 34 refs. [Pol.pol. f. russ.]

The author calls the maximum % of space occupied by the aerial portion (stem and branches) of a tree in a specific environment the 'ecological saturation of the space'; this magnitude is independent of the height and age of trees. He develops the following formula for it:

$$E = \frac{N\left[M^2 + \left(\frac{d_n - d_1}{5}\right)^2\right] 0{\cdot}8\,F}{100}$$

where N is the number of trees/ha.; M, d_n, and d_1 are the diameter of the average, thickest and thinnest stem, respectively; F = 4th root of (K/H) for conifers, H being average height, and K a constant for the given species (1·689 for Scots Pine, 2·821 for Norway Spruce, and 3·027 for Silver Fir). It is claimed that the above 'stand equation' when applied to data from successive enumerations, enables the changes that have occurred in the following stand components to be evaluated: number of trees, their mean diameter, the shift in the numbers of the small- and large-diameter stems, basal area, space occupied, stand volume and its form factor. The formula gives results agreeing very well with those from Huber's method.

54. ASSESSMENT OF SITE QUALITY

See also No. 1657.

1652. Coile, T. S., and Schumacher, F. X. **Relation of soil properties to site index of Loblolly and Shortleaf Pines in the Piedmont region of the Carolinas, Georgia and Alabama.** *J. For.* 51 (10), 1953 (739–44). 2 refs.

In a geographical extension of previous work [see *For. Abstr.* 10 (No. 1499)] the number of plots has been raised to 123 Loblolly and 199 Shortleaf. The combined data have provided new regressions, the correlations with x_1 (thickness of A horizon in in.) and x_9 (imbibitional water values of B horizon) previously shown to be of material significance, being illustrated graphically with the new data. Burning and geographical latitude are also tested for significance. The regression equations are:—

Loblolly:

$$\log \text{S.I.} = 2{\cdot}0188 - \frac{0{\cdot}399}{x_1} - 0{\cdot}00843\,(x_9) - \frac{0{\cdot}0198}{x_9}$$

Shortleaf:

$$\log \text{S.I.} = 1{\cdot}8878 - \frac{0{\cdot}1580}{x_1} - 0{\cdot}00859\,(x_9) - \frac{0{\cdot}0408}{x_9} + 0{\cdot}0053\,(L)$$

(where $L = +1$ in the north and -1 in the south region).

Burning is significant for neither species and latitude only for Shortleaf. x_1 and x_9 again proved highly significant for both species. The field work, which it is claimed involves only $\frac{1}{3}$rd the time required for the height/age determinations, is described in detail. No significant difference was found in the results got by the two methods.

1653. MERZ, R. W. **Site-index estimates made easy.** *J. For.* 51 (10), 1953 (749–50). 1 ref.

Describes a site-index meter for *Quercus alba* in the hills of S.E. Ohio, which combines the three important variables found to influence site quality for this species: (1) how far up the slope the site is located, (2) aspect of the slope, and (3) depth of soil. It consists of a block of wood, $5\frac{1}{4} \times 3\frac{1}{4}$ in., with a central recess to take a 1-in.-diam. compass. Round this are 4 concentric rings representing the ridge, upper, lower, and lowest slope positions. In the eight sectors, with N. at the top and the E. and W. cardinal points reversed, are inscribed site indexes in groups of three to five, and a table of 4 topsoil depths (2–18 in.) is referred to for the choice of a particular index of the group to which the needle points when the top end of the meter (held level) is directed downhill.

1654. FINN, R. F. **Mineral content of leaves clue to White Oak site quality.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 135, 1953. pp. 12. 11 refs.

Samples of leaves were taken from 129 dominant and co-dominant trees, at least 3 from each of 33 $\frac{1}{5}$-acre plots. Composite plot samples, obtained by combining equal weights of oven-dry leaves from each tree sampled within the plot, were analysed for N, Ca, K and P, with the following results: (1) Site index, expressed as height of dominants and co-dominants at 50 years and ranging from 50 to 73, increased as distance from a ridge top and foliar N increased. After the effect of distance from ridge top is removed, each 0·1% increase in foliar N corresponds to an increase of roughly 1 ft. in site index for the range of N concentrations found. (2) Foliar N also increased with thickness of the A_2 horizon and of the total A horizon, but not with that of the A_1 or B_1 horizon. (3) No conclusive data were obtained for any relation of foliar N to moisture content, stand density, age or aspect of site. (4) Foliar Ca increased significantly with the silt and clay % of, and the concentration of roots in, the A horizon, but no correlation could be found between these two factors. Foliar Ca amounts were low compared with those found by other workers but growth did not appear to be affected by this lack. (5) Foliar K and P did not appear to be related either to site or to soil. (6) No interrelationship could be found between the four elements.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 1238, 1265–7, 1284, 1353–7, 1364–6.

1655. ERTELD, W. Wachstum und Ertrag der Robinie im Gebiet der Deutschen Demokratischen Republik. **[Growth and yield of *Robinia pseudoacacia* in the German Democratic Republic.]** Doctoral thesis, Forstwirtschaftliche Fakultät, Humboldt-Universität Berlin. 1952. pp. 144 + [2]. 177 refs. [G.g.]

This work is at the same time a review of the literature on Robinia in Europe—which, though voluminous, contains little that is supported by adequate research—and a report on studies by the author and his collaborators of 82 stands, of all age groups, representing all the major plantations in Eastern Germany, which are shown in a sketch-map. The first half of the work deals with biology and silviculture under the heads: characters (botanical, crown and stem, flowers and seeds, root system); cultivation (site requirements, seed collection and treatment, nursery practice, planting, reproduction from coppice and root suckers, tending); pure and mixed stands, silvicultural system and rotation. The remainder is devoted to increment and yield studies, with an account of the material used for compiling the author's provisional yield table. The latter is given, with discussion of individual factors (height, mean diam., b.a. etc.), and a final section presents the results of stem analyses of 8 trees from 2 localities. It is emphasized that much more research is necessary before a really reliable monograph can be prepared.

1656. SCHOBER, R. Die japanische Lärche: eine biologisch-ertragskundliche Untersuchung. **[Japanese Larch: an investigation of growth, yield and biology.]** *SchrReihe forstl. Fak. Univ. Göttingen* No. 7/8, 1953. pp. xii + 212 + 46. 120 refs. [G.]

This work—an extension of the author's research on European Larch [see *For. Abstr.* 12 (No. 2504)]—is necessarily an interim report, since Japanese Larch plantations in Germany date only from shortly before the turn of the century. It is, however, a comprehensive summary of present knowledge of the behaviour of this species in W. and S. Germany, based on data from over 150 sample plots, supplemented by comparative data from Denmark, Sweden, Holland and the U.K., and from Japan. Its chapters deal with: distribution (natural range, cultivation in Europe, situation and condition of sample plots and stands); site requirements (climate, soil); susceptibility to injuries (fungus diseases, mammal and insect damage, injuries due to atmospheric agencies); silvicultural behaviour and treatment (stand formation, branching and natural pruning, thinning, provenances and hybrids, behaviour in pure and in mixed stands, comparison with European Larch); growth characters of the individual stem (form, increment, bark %; heartwood formation); and the increment and yield of stands (pure stands, performance in mixture, yield by assortments; with a yield table and an assortment yield table for stands up to 60 years old, of 2 site classes, under moderate and heavy thinnings); and conclusions.

There is considered to be ample evidence of the value of Japanese Larch, properly treated, for plantations in Germany and other northern European countries. As compared with European Larch it is less exacting as to soil and light, less susceptible to *Taeniothrips laricivorus* [cf. *For. Abstr.* 15 (No. 1568)], resistant to *Dasyscypha willkommii* canker, recovers better from deer damage, shows better establishment, and has a better stem form, higher volume yield and higher yield of the larger timber assortments. Its disadvantages are its greater moisture requirement and hence greater susceptibility to drought, some liability to attack by *Phomopsis pseudotsugae* (almost completely preventable by summer pruning), somewhat slower litter decomposition, and its tendency to form large

branches when widely spaced or when it gets away too quickly in mixtures.

1657. SCHMIDT, H. Kronen- und Zuwachsuntersuchungen an Fichten des bayerischen Alpenvorlandes. [**Investigations on crown and increment in Norway Spruce of the Bavarian foothills.**] *Forstwiss. Cbl.* 72 (9/10), 1953 (276–86). 3 refs. [G.]

Study of 40 Spruces, divided into 4 groups according to yield class, age and site, permitted the following conclusions: (1) Other factors being constant, stem increment increases with dry needle weight, and is greater on the better sites. Within this general trend, however, there are variations in individual trees. (2) Needle area has no direct relationship to fresh needle weight, and although a general relationship exists between needle area and stem increment, marked variations occur in individual trees. (3) A definite relation exists between crown diameter and stem increment, the increment values being higher on the better sites; but again there are individual variations. (4) A direct relationship exists between assimilation rate and stem increment. (5) The longer the needles, the greater the stem-increment values: correlation between 1000-needle-weight and stem increment is less close because needle circumference is not related to needle length or to stem increment. (6) There are wide differences in the assimilation rates of individuals within the same group. (7) There is no absolute relationship between needle length and assimilation rate. (8) Within the general rule that wood density decreases with the higher increment rates, wide individual variations exist. (9) Since assimilation rates of trees on poor sites are lower than those on good sites, the relationship between dry needle weight and wood density is not so close as might be expected. (10) Low assimilation rates are only correlated with high density when they are due to a poor site.

Three main factors therefore influence crown development, needle weight and stem increment: (*a*) *Site*—the better the site, the greater the assimilation rates and the greater the increment. (*b*) *Needle volume*—the greater the volume, the greater the increment; with greater needle volume the assimilation rates decrease, but not to a degree affecting this relationship seriously. (*c*) *Individual tree characters.* Of these factors (*a*) is the most important. However, the assimilation rate (although influenced by site), and the needle volume (although influenced by growing space), also depend on individual tree characters, and it should be possible to exercise a selection of suitable trees. [Cf. *For. Abstr.* 13 (No. 4092).]

561. *Increment in Height, Diameter, Basa Area, Form and Quality. Variations and Trends; Dendrochronology*

See also Nos. 1168, 1189, 1194–7.

1658. PRIMAULT, B. Quelques considérations sur les conditions météorologiques et l'accroissement forestier. [**Meteorological conditions and forest growth.**] *Schweiz. Z. Forstw.* 104 (10), 1953 (524–34). 11 refs. [F.f.g.]

The author studied the growth of Norway Spruce from 5 stands situated on the Swiss tableland, in the pre-alps, and in the Engadine, by means of increment cores and meteorological data for 25 years. The meteorological factors considered were mean temperature, length of growing season, accumulated temperature and total precipitation (these last 3 factors were calculated as % of the corresponding mean for the whole period 1926–50). It was shown that the influence of temperature increases, while that of precipitation diminishes, with increasing altitude. The precipitation factor to be considered is accumulated precipitation during the growing season, in relation to altitude. A wet autumn appears to have an unfavourable effect on the following year's growth.

1659. LYON, C. J. **Vertical uniformity in three New England conifers.** *Tree-Ring Bull.* 20 (2), 1953 (10–6).

Until the point has been tested for geographical area, there is no certainty that the sequence of relative ring-widths found at one level in a tree trunk will be repeated in measurements at some other level above the roots. Analysis of specimens of *Pinus strobus*, *Picea rubens* and *Tsuga canadensis* growing in various parts of New England showed a high degree of uniformity in the sequence of growth-rings at different levels in the tree. Contrary results have been obtained in Arizona and California.

562. *Volume Increment*

See also No. 1668.

1660. GROCHOWSKI, J. Metoda badania przyrostu miąższości drzewostanów. [**Method of investigating the volume increment of stands.**] *Sylwan* 97 (4), 1953 (242–57). 11 refs. [Pol.russ.g.]

Both of the generally used methods of determining the c.a.i. on permanent test plots, viz. from the difference in volume (1) calculated from sample trees, plus volume of trees removed during the period, and (2) calculated by applying the same volume tables at the beginning and end of the period, are considered by the author to be unreliable. He suggests determining the c.a.i. at the end of each period by calculating the increment of a large number of felled sample trees. The increment should be determined on short sections, preferably with the aid of the increment borer. It is claimed that, for 27 sample trees and 1-m. sections, the error in determination of c.a.i. for a 5 or 10 years' period in an 80-year-old Pine stand is $\pm$ 4·7–4·8%.

1661. ILVESSALO, Y. Luontainen poistuma Suomen metsissä. [**Natural drain in Finnish forests.**] *Metsät. Aikak.* 1953 (9), (271–4). [Fi.e.]

Presents, on the basis of semi-permanent and permanent sample plots and yield tables for natural normal stands, a calculation of the amount of wood decaying to the ground unused in untouched stands. On semi-permanent plots left untreated for ca. 10 years, the figure for young stands was 5–10%, for intermediate stands 5–15% and for mature stands 15–25% of increment. Corresponding figures in permanent plots were 15–20, 20–30, and 30–40%, whereas in thinned areas the figure was below 10%.

and sometimes negligible. Yield tables for untouched, fully stocked Pine stands show high %s, increasing with age, e.g. 50–60% in S. Finland at 110 years and 80–90% in N. Finland at 160–200 years. *From author's summary.*

568. *Other Mensurational Studies of Stand Constitution and Changes Therein. Distribution of Growth by Tree Classes etc.*

1662. Szymkiewicz, B. Studia nad optymalną strukturą drzewostanu jodłowego w gospodarstwie przerębowym. **[Studies on the optimum structure of a Silver Fir stand under selection felling.]** *Prace Inst. Bad. Leśn.* No. 73, 1951. pp. 127. 26 refs. [Pol.pol.russ.f.]

Presents the results of stand analyses of a Silver Fir plot (1·4 ha.) in the Świętokrzyskie Mts. directed particularly to an examination of the relationships existing between stand structure and the increment of its components. To this end 5 vigour classes indicative of growth conditions were distinguished on stated criteria and all the components of volume increment determined for all the developmental stages in each class; these and their interrelations are analysed in graphs and tables and related to an analysis of the stand structure as a whole. In particular, a comparison is made of the distribution of stand volume c.a.i. over the 4 highest vigour classes (the 5th contributing a negligible amount, and the 4th only 4·1%, to the total c.a.i.) and over d.b.h. gradations (4-cm.) and classes (small, medium, and large). Taken together with an analysis, for the first 3 vigour classes, of the ages and diameters at which the trees pass from one to another of the phases of their growth curve, this enables the author to propose a more practical division into 4 diameter classes which correspond broadly to the 4 main phases of growth in volume and are therefore better suited to the analysis of increment distribution in the stand, viz.: (*a*) up to 22 cm. (slow volume c.a.i.), (*b*) 22–38 cm. (rapid), (*c*) 38–58 cm. (peak value), and (*d*) above 58 cm. (gradual decline in c.a.i.). Thence a method is developed for controlling changes in the constitution of a stand, employing a table and graph from which the vol. c.a.i. can be predicted for certain theoretical variants of the stand structure on one and the same area. Silvicultural measures are then applied in accordance with the variant characterized by the maximum vol. c.a.i. of the best-quality material.

58. SURVEYING AND MAPPING. AERIAL SURVEYS

See also No. 1475.

1663. Eckel, L. H. **The hatchet planimeter.** *For. Chron.* 29 (3), 1953 (273–7). 5 refs.

Cf. *For. Abstr.* 13 (No. 2349).

1664. Numéro consacré à la photographie aérienne et à ses applications forestières. **[A number devoted to aerial photography and its forestry applications.]** *Rev. for. franç.* 5 (11), 1953 (725–85 + 10 plates). 76 refs. [F.]

Includes articles on the following: general ideas on aerial photography (*J. Boutin*); aerial photography and forestry problems (*P. Rey*); aerial photography and statistical method in relation to forestry (*Anon.*); the use of aerial photography in forest management (*G. Luzu*); applications of aerial photography to forestry in Réunion (*J.-M. Miguet*); some uses of aerial photography in the restoration of mountain land (*P. Chabrol*); aerial photography and degraded forests (*G. Plaisance*). There is also a bibliography of 76 references dealing with aerial photography.

1665. Welander, E. Ett nytt stereoinstrument för flygbildet. **[A new stereoscope for air photographs.]** *Skogen* 40 (9*), 1953 (101*). [Sw.]

Describes with illustrations a mirror stereoscope designed for the forestry section of Mo och Domsjö A.B., with special adjustments for altering the relationship between the two photographs, and a device for [e.g. tree] height measurement.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also Nos. 1241, 2175.

1666. Foggie, A. **On the problems of management of the forest reserves in the closed forest zone of the Gold Coast.** *Emp. For. Rev.* 32 (4), 1953 (330–41). 9 refs.

An expansion of part of a report presented to the 6th British Commonwealth Forestry Conference. [Cf. *For. Abstr.* 14 (No. 1788).]

1667. Cozzo, D. Ordenación de los bosques higrofíticos y subtropicales de Misiones, Argentina. **[Management of the subtropical rain forests of Misiones, Argentina.]** *Carib. For.* 13 (4), 1952 (145–72). 14 refs. [Span.E.]

Presents data on the topography, soils, climate and ownership of the Misiones forests, with a brief description of their composition. A management plan requires a survey, classifying stands by quality, stocking and age classes. The stands should then be converted over a period of 60–90 years by the periodic-block method outlined by Fontana [cf. *For. Abstr.* 12 (No. 846)] to an even-aged forest of 2–4 species. A list of marketable species suitable for reforestation is included; also short notes on regeneration, utilization, transport and marketing of Misiones species.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also No. 1241.

1668. Pipan, R. O kontrolnim metodima uređivanja prebirnih šuma. **['Méthode du contrôle' in the management of selection forests.]** *Šum. List* 77 (2), 1953 (57–66). [Croat.g.]

The method has so far found little application in the management of Jugoslav selection forests. This neglect is due not only to the backwardness of management and administration but to the influence of eminent specialists like Hufnagl, who were opposed to its application in selection forest. Hufnagl's ideas and the results of their implementation are shown to have been wrong, and the practical achievements of Pogačnik [cf. *For. Abstr.* 14 (No. 3237)] in Slovenia are stressed.

1669. Sidki, I.; Probyn, E. H. **Pamphlet on Cyprus working plan.** *Tech. Pamphl. For. Dep. Cyprus* No. 11, 1952. pp. 20 + 1 map + 2 dgms.

An account of the procedures followed in preparing working plan reports.

1670. **Working plan code, Uttar Pradesh. Compiled in the Working Plans and Research Circle, Uttar Pradesh.** Superintendent, Printing and Stationery U.P., Allahabad. 2nd ed., 1953. pp. xi + 94.

1671. Bolotin, M. **[Management of Eucalypt plantations.]** *La-Yaaran* 3 (2/3), 1953 (58–9, 79). 4 refs. [Heb.e.]

Research is proposed on the annual increment obtained for different rotations (now ranging from 7 to 21 years) for Eucalypt plantations in the coastal area of Israel. Proposed steps to obtain a regular supply of wood from the plantations include: division of each into annual coupes; replanting areas where stumps have not coppiced during the first few years after cutting; in waterlogged areas, cutting so that the tops of the stumps are above the winter water level to ensure coppice regeneration; research on the proper method of thinning the shoots on each stump and maintaining a regular annual supply of wood from any future expansion of the plantations. *From author's summary.*

1672. Webster, G. **Revised working plan for the Kampala plantations for the period 1950–54.** Forest Department, Uganda. 1952. pp. iii + 24 + 1 map.

The first revision lays down a coppice rotation of 8 years for the supply of fuel from *Eucalyptus saligna*. With a mean annual rainfall of 49 in., the m.a.i. may be 900 solid cu. ft./acre, but 430 is taken for fixing the yield.

1673. Amidon, G. B. **Planning for sustained yield operations.** *J. For.* 51 (10), 1953 (720–5).

The Minnesota Ontario Paper Co. intends to manage its Spruce, Balsam Fir, Jack Pine, Poplar and Aspen in the U.S. and Canada on a sustained-yield basis both by species and coupe, and 52 areas of 500–60,000 acres have been established. Spruce dies at 150–160, Jack Pine and Poplar at 80 years, and yield will be limited, in spite of losses due to the preponderance of mature timber, in order to attain a sustained yield within 10 years. The advantages are greater production from smaller areas nearer the mill, continuous use of labour, and better returns from extraction overheads (roads, permanent camps). The rising value of timber will justify this higher and more economical production of better-quality material. The farm woodlot is preferred on account of its accessibility and permanence, to larger units.

1674. Cummings, W. H., and Zarger, T. G. **Guide for improved forest management for sawtimber from the major hardwoods in the Tennessee Valley.** Division of Forestry Relations, Tennessee Valley Authority, Norris, Tenn. 1953. pp. 56. 23 refs.

Discusses and explains the use of (1) butt-log tree grades, (2) tree vigour classes, (3) stumpage value for the principal species (4 Oaks, Hickory and *Liriodendron tulipifera*) in (*a*) stand inventories, (*b*) marking sawtimber for cutting, and (*c*) management for sustained yield.

1675. Ellertsen, B. W., and Lane, P. **Lumber price ratios for computing quality index of Tennessee Valley hardwoods.** *Tech. Note Tenn. Vall. Auth.* No. 15, 1953. pp. 15. 14 refs.

Discusses and tabulates price ratios for a number of grades of converted timber for the commoner hardwoods of the Tennessee Valley for use in computing the 'quality index' of different species.

64. FORESTRY AS A BUSINESS: GENERAL

See also Nos. 1684–5, 1687, 2162.

1676. Petrini, S. **Elements of forest economics.** Oliver and Boyd, Edinburgh. 1953. pp. viii + 210. Translated by M. L. Anderson. Price 22*s.* 6*d.*

Cf. *For. Abstr.* 9 (No. 1960).

1677. Skok, R. A., and Hall, O. F. **Farm income from sales of cut forest products as compared to sales of stumpage [in Minnesota].** *Minn. For. Notes* No. 23, 1953. pp. 2.

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 1238, 1317–8, 1360, 1449, 1455, 1473–4.

1678. Davis, P. W., and Grant, G. C. **Survey of private forestry costs in Scotland. First annual report 1951–52.** Department of Forestry, University of Aberdeen. 1953. pp. 8 + 11 tbls.

This first report is partly concerned with the selection and classification of sample estates. The tables summarize average costs of ground preparation (excluding drainage), new drainage, fencing, planting, beating up, weeding, and thinning.

1679. Becking, J. H. **Thinning research in forestry.** *Netherlands Journal of Agricultural Science, Wageningen* 1 (2), 1953 (122–9). [E.] E.M.B.

An account in English of research already described [cf. *For. Abstr.* 14 (No. 1453)] on the effect of thinning grade on increment, costs and value for Douglas Fir.

66. COSTING OF LOGGING OPERATIONS

See also Nos. 1363, 1429, 1449, 1864.

1680. Roe, A. L., and Squillace, A. E. **The effect of cutting methods on logging costs in Larch-Douglas Fir.** *J. For.* 51 (11), 1953 (799–802).

Analyses and tabulates the direct logging costs under 3 cutting methods (*a*) seed-tree, (*b*) economic

selection, (*c*) shelterwood, the costs of the initial cuts per 1000 bd. ft., log scale, being $11·29, 14·66, and 16·89 respectively. Estimates of savings in second-cut costs in (*b*) and (*c*) do not offset their greater initial cutting costs, due mainly to the smaller volumes or smaller trees removed.

1681. **Hardwood logging costs in the Tennessee Valley.** *Tech. Note Tenn. Vall. Auth.* No. 16, 1953. pp. 7 + 3 dgms. + 6 gphs. + 3 tbls. + 1 map.

Study of 15 logging operations showed that, under optimum conditions, the chain saw is about twice as effective in felling and cross-cutting as the cross-cut saw (3 man-hours/1000 bd. ft. *vs.* 6). Average distances skidded for tractor, team, and single animal were 2341, 633, and 184 ft. respectively; average volumes/trip were 822, 84 and 56 bd. ft. Loading was done almost entirely by hand and hauling by truck; loads averaged 979 bd. ft. and hauling distance 7·1 miles. At current wage rates, the following rule of thumb indicates the approximate effect of tree diameter on logging costs: logging costs decrease $1·00/1000 bd. ft. with each increase of 1 in. in tree d.b.h.

1682. Rothé, P.-L. Les éléments du prix de revient des bois d'exportation de la Côte d'Ivoire. **[Factors involved in cost prices of export timbers from the Ivory Coast.]** *Bois For. Trop.* No. 27, 1953 (27–38). [F.e.span.]

67. ASSESSMENT OF FINANCIAL RESULTS; BOOK-KEEPING AND ACCOUNTANCY; BUSINESS STATISTICS; SHORT-TERM PLANNING AND FINANCING

1683. Becking, J. H., and Sewandono, R. Richtlijnen voor de financiële boekhouding van bosbedrijven. **[Guides for book-keeping in forestry.]** *Ned. Boschb.-Tijdschr.* 25 (11), 1953 (289–301). [Du.]

Gives specimen balance sheets and discusses details covered by the different heads.

1684. Richter, A. Die Zeitreihe als Spiegelbild der Forstwirtschaftsentwicklung. **[The 'time series' as a mirror to the evolution of the forest economy.]** *Arch. Forstw.* 1 (3), 1952 (145–52). 5 refs. [G.]

For the elucidation of trends in forest economy the 'time series' method brings the data to an organic whole and eliminates difficulties such as the changing value of money. The expenditure of the state forest department of Saxony (1817–1938) is used to illustrate the method. Money spent on (*a*) silviculture, (*b*) roads and (*c*) total for forest improvement, with (*a*) and (*b*) expressed as % of (*c*), are graphed against the years. Up to 1864, fuel production was the chief aim and about twice as much was spent on silviculture as on roads. But with the turn-over to timber, road expenditure (justified by higher prices at auctions) crept up, conservation gave way to exploitation forestry, and roads got ⅔ of the available money until 1914. The return to conservative forestry (1920–26), its abandonment again in the financial depression of 1926–38, and other salient points are discussed.

1685. Reynolds, R. R. **Fifteen years of management on the Crossett farm forestry forties.** *Occ. Pap. Sth. For. Exp. Sta.* No. 130, 1953. pp. 27.

Gives details of 15 years' treatment of a well stocked 40-acre and a poorly stocked 36-acre woodland of mixed Pine and hardwoods, managed intensively with annual fellings, with figures for yields of different timber assortments, financial returns and employment created, and describes the present state of the two woodlands.

1686. Kotwal, E. K. **Financial aspects of artificial Teak plantations in the Kanara district of the Bombay State.** *Indian For.* 79 (11), 1953 (626–7).

Analyses costs of establishment and revenue from thinnings for two plantations.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

See also Nos. 1027, 1456.

1687. Brown, W. J. **Forestry and the growth of Kimberly-Clark corporation.** *J. For.* 51 (11), 1953 (792–4).

Emphasizes the use (in land purchase, silviculture, pest-control and management plans) made of professional foresters to ensure the annual pulpwood supply of over a million cords. Contract logging has been abandoned in favour of company operation under trained foresters, which has led to a marked fall in costs to mill. The work is now controlled by 120 foresters blended into the organization at all levels.

1688. **The Timber Trades Journal and Sawmill Advertiser coronation and annual special issue.** Bouverie House, 154 Fleet Street, London, E.C.4. 2 June, 1953. pp. 324.

Includes special sections on: the Commonwealth, with articles by different authors on research, trade organization, the Forestry Commission and forestry societies in the U.K., and the forests of Malaya, Nigeria, Gold Coast, W. Indies, British Columbia and E. Canada, Burma, Siam, S. Africa, N. Zealand and Australia; overseas markets, with articles on Sweden, Finland, Jugoslavia, Austria, France, the Amazon, Norway, Denmark and W. Germany; and sawmill engineering, with articles on individual firms, mainly British.

1689. SPEER, J. Grundzüge der Struktur und Erzeugung der Forstwirtschaft und der holzverbrauchenden Industrien Westdeutschlands. [**Fundamentals of structure and production of forestry and wood-consuming industries in Western Germany.**] *Holz Roh- u. Werkstoff* 11 (9), 1953 (333–42). [G.g.] P.R.

Describes, discusses, and illustrates with graphs and tables, the forest area, volume increment, felling, import and export of wood, production of the wood-consuming industries, number and size of plants, prices, and costs.

71. MARKETING OF FOREST PRODUCTS: GENERAL

1690. TEILLAC, J. Le commerce des bois en Côte d'Ivoire. [**Timber marketing in the Ivory Coast.**] *Bois For. Trop.* No. 31, 1953 (31–41). [F.e.span.]

Deals mainly with log grading, and contracts of sale.

1691. MALLINSON, R. F. A., and GRUGEON, R. **Timber trade practice.** Cleaver-Hume Press Ltd., London. 2nd ed. (rev.) 1953. pp. 328 + 4 forms in pocket. Price 21*s.*

A revised and enlarged edition of the handbook first published in 1950 [cf. *For. Abstr.* 12 (No. 3315)]. There is a new chapter on Marine Insurance, and all the statistical and legal material has been brought up to date.

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

See also Nos. 1696, 2104, 2145, 2152–4, 2158.

1692. MACGREGOR, J. J. **The source and nature of statistical information in special fields of statistics: timber statistics [for Great Britain].** *Repr.* from *Journal of the Royal Statistical Society, London, Series A (General)* 116 (3), 1953 (298–322). 77 refs.

73. PRICES

See Nos. 1675, 1682, 1693–4.

74. TRADE POLICY

See also Nos. 1027, 1648–9.

1693. **The Monopolies and Restrictive Practices Commission report on the supply of imported timber.** H.M. Stationery Office, London. 1953. pp. 138 + 1 dgm. Price 4*s.* 6*d.*

Deals mainly with the 'approved list' system by which imports of softwoods into the United Kingdom are mainly regulated, and with local price lists for softwoods.

78. ECONOMICS OF TRANSPORT

See also Nos. 1439–40.

1694. RECTOR, W. G. **Log transportation in the Lake States lumber industry 1840–1918: the movement of logs and its relationship to land settlement, waterway development, railroad construction, lumber production and prices.** The Arthur H. Clark Company, Glendale, California, U.S.A. 1953. pp. 352 + 1 photo. Many refs. Price $10. (£4).

1695. WAGEMANN W., G. Consideraciones sobre el transporte ferroviario de las maderas. [**The rail transport of timber.**] *Chile Maderero* 3 (5), 1953 (4–5). [Span.]

Presents data on the cost of rail transport of 14 different timber species from their source of production in Chile to the main centres of consumption within the country, and suggests that costs could be reduced by seasoning and partially converting the timber before transport.

1696. WAGEMANN W., G. Transporte y consumo de maderas asserradas. [**Transport and consumption of sawn timber.**] *Chile Maderero* 3 (1), 1953 (3, 5). [Span.]

Presents and discusses Chilean statistics covering the years 1946–50.

79. ECONOMICS OF THE WOOD INDUSTRIES

See also Nos. 1903–4, 1913, 2069.

1697. **Map of the northern wood industries.** AB Svensk Trävaru-tidning, Kungsgatan 17, Stockholm. 2nd ed. 1952. Wall map. Scale 1: 1,500,000, with Index (pp. 164). [E.]

1698. GRUJIĆ, Ž. Mehanička prerada drveta u N. R. Srbiji. Finalna proizvodnja. [**Mechanical conversion of wood in Serbia. Final products.**] *Šumarstvo* 5 (6), 1952 (477–89); 6 (2), 1953 (98–107). 1 ref. [Serb.serb.e.f.]

See also Nos. 2167–8.

1699. **A hundred definitions pertaining to wood and other forest products.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. 240 (rev.) 1952. pp. 11. P.R.

1700. DESCH, H. E. **Timber, its structure and properties.** Macmillan and Co. Ltd., London. 3rd ed., 1953. pp. xxiv + 350 + 65 plates. Many refs. Price £1. 5*s*.

A revision and expansion of the 1947 edition [see *For. Abstr.* 9 (No. 2224).] Several of the chapters have been modified and there is a new chapter on eradication of fungal and insect attack, discussing methods of treating existing attacks by common fungus and insect pests.

1701. KYNOCH, W. **The rôle of wood utilisation and similar curricula in forestry education.** *J. For.* 51 (10), 1953 (727–30).

The demand for wood technologists of professional standard exceeds the supply. Forestry rather than engineering schools should direct their training, which should be confined to students of good status, and cover (after a good grounding in mathematics, chemistry and physics) wood structure and identification, physics and chemistry of wood products, mechanics, stress grading, fasteners, drying, adhesives, machining, fire-retardation, research methods, report-writing, plant maintenance, personnel relations, and the scientific control of timber production. The subject is now so large and so rapidly advancing that it cannot be adequately treated as a part of general forestry training. It requires a highly qualified staff, concentrated in a few schools in localities where wood industries are reasonably important.

1702. HENDERSON, F. Y. **The Forest Products Research Laboratory [Princes Risborough].** *Proc. roy. Soc., Lond.* 141*B* (905), 1953 (435–44 + 4 photos). O.R.S.

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

810. *General Information on Woods*

See also No. 1892.

1703. CLIFFORD, N. **Commercial hardwoods: their characteristics, identification, and utilization.** Sir Isaac Pitman & Sons Ltd., London. 1953. pp. ix + 137 + 100 photos. 55 refs. Price 21*s*.

Contains descriptions of 100 species.

1704. **Specimen woods Nos. 214–6.** *Suppls.* to *Wood* 18 (10–12), 1953 (387–8; 429–30; 469–70).

Red Satinay (*Syncarpia hillii*), Brush Box (*Tristania conferta*), and Canarium (*C. schweinfurthii*).

1705. **Foreign woods frequently imported into the United States.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1903–12, 1952. pp. 19 + 2 tbls. 23 refs. P.R.

Describes 32 woods (mostly hardwoods) and tabulates strength, sp. gr., weight, and shrinkage data for most of them.

1706. LAMB, G. N. **Foreign woods.** *Wood, Chicago* 58 (8), 1953 (46–7). P.R.

Baitoa (*Phyllostylon brasiliensis*); Copaiba Balsam (*Copaifera officinalis*); Vinhatico de Espinho (*Chloroleucon vinhatico*).

1707. KRYN, J. M. **Information leaflet. Foreign woods. Gonçalo Alves—*Astronium fraxinifolium* Schott. and *Astronium graveolens* Jacq., including var. *planchonianum* (= *A. planchonianum* Engl.). Family: Anacardiaceae.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1934, 1952. pp. 10. 35 refs. P.R.

1708. GERRY, E. **Information leaflet. Foreign woods. Mancono—'Philippine Lignumvitae'—Philippine Iron Wood. *Xanthostemon verdugonianus* Naves. Family: Myrtaceae.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1936, 1952. pp. 4. 7 refs. P.R.

1709. GERRY, E. **Information leaflet. Foreign woods. Pyingado, Pyinkado. *Xylia dolabriformis* Benth. (= *Mimosa xylocarpa* Taub.). Family: Leguminosae.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1938, 1952. pp. 6. 14 refs. P.R.

1710. **[Colonial timbers.]** *Bois For. Trop.* No. 26, 1952 (389–92); Nos. 27–31, 1953 (23–6; 35–8; 17–20; 39–42; 27–30). [F.]

Simarouba (*Simaruba* spp., particularly *S. amara* and *S. glauca*); Fromager (*Ceiba pentandra*); Balata Rouge (*Manilkara bidentata*); Agba (*Gossweilerodendron balsamiferum*); Andoung (*Monopetalanthus heitzii*); and Naga (*Brachystegia cynometroides*).

1711. NORMAND, D. Ekop ou Andoung, une des essences intéressantes à retenir. **[Ekop or Andoung, an interesting species worth consideration.]** *Bois For. Trop.* No. 26, 1952 (381–7). [F.e.span.]

Botanical and silvicultural characters and wood properties of *Tetraberlinia bifoliolata*.

1712. SCOTT, J. D. **Some Nigerian timbers.** Forest Department, Ibadan. 1950. pp. [3] + 33 + 5 photos. Price 3*s*.

Tabulates for about 111 species details on nomenclature, log specifications, floatability, natural durability, preservative absorption, weight, colour, grain, hardness and working properties. Utilization notes are given for 94 of these species, among which the following are of more general interest: *Adina, Canarium, Celtis* (2), *Chlorophora, Coelocaryon, Entandrophragma* (4), *Gossweilerodendron, Khaya* (3), *Klainedoxa* (2), *Macrolobium* (*Gilbertiodendron*), *Musanga, Piptadenia, Ricinodendron, Staudtia,* and *Terminalia* (3).

1713. **Notes on the utilization and silviculture of the timbers used in wood-based industries of India.** *Indian For.* 78 (6; 7), 1952 (274–88; 348–70).

1714. THOMAS, A. V., and LANDON, F. H. **The timber of Para Rubber [*Hevea brasiliensis*].** *Malay. Forester* 16 (4), 1953 (217–9).

Tests were made at Kepong on wood from 3 trees from a Rubber estate near Kuala Lumpur. The

wood is moderately hard and heavy (40–44 lb./cu. ft. at 15% m.c.). It contains much starch and is therefore liable to staining and *Lyctus* damage. Sawing was easy but resawing was difficult owing to the presence of tension wood. The original m.c. averaged 56% and seasoning to air-dry condition was fairly rapid, taking 2–2½ months for ½-in. boards and 3–3½ months for 1½-in. boards. The air-dry m.c. is high (17% compared with 13–15% for most timbers in Malaya). Shrinkage is exceptionally small: 0·7–1·1% radially and 1·1–1·7% tangentially from green to air-dry condition; the oven-dry shrinkage averaged 2·5% and 5·1% respectively. About half of the boards, however, became bowed and twisted during seasoning. Untreated timber is known to have poor durability, but it absorbs preservatives readily. It is 25–50% higher than *Pinus sylvestris* in all strength properties except stiffness, in which it is about equal.

1715. **Trees and timbers of Sarawak and Brunei.** *Leafl. For. Dep. Sarawak* Nos. 9–23 [1953]. [Cf. *For. Abstr.* 15 (No. 599).]

(9) *Vatica* spp., *Cotylelobium* spp., and *Upuna borneensis* (pp. 10).

(10) *Casuarina sumatrana, C. equisetifolia, Lumnitzera littorea, L. racemosa, Terminalia catappa* and *Octomeles sumatrana* (pp. 7).

(11) Various species of *Shorea* and *Anisoptera* (pp. 6).

(12) Species of *Diospyros, Gymnacranthera, Myristica, Horsfieldia, Knema, Pasania, Quercus,* and *Castanopsis* (pp. 7).

(13) *Fagraea fragrans, F. gigantea, F. racemosa, Anthocephalus cadamba, Jackia ornata, Nauclea* spp., *Neonauclea* spp., and *Tetramerista glabra* (pp. 10).

(14) *Baccaurea* spp., *Bridelia tomentosa, Elaeriospermum tapos* (including uses of seed), *Endospermum malaccense, Excoecaria agallocha, Macaranga* spp. (including myrmecophily, kino and lac production), and *Mallotus* spp. (pp. 9).

(15–17) Yellow, Red, and Dark Red Meranti (*Shorea* spp.) (pp. 5, 16, 9).

(18) *Aglaia argentea, Melia excelsa, Sandoricum* spp., *Xylocarpus granatum* and *X. moluccensis* (pp. 7).

(19) *Shorea atrinervosa, S. geniculata, S. glauca, S. havilandii, S. maxwelliana, S. scrobiculata,* and *S. seminis* (pp. 7).

(20) Sapotaceae (main genera *Palaquium, Ganua, Lucuma, Madhuca,* and *Payena*), including notes on latex and giving more detail on the cultivation of *Palaquium gutta* and the collection of gutta percha (pp. 8).

(21) *Adenanthera* spp., *Albizzia falcata, Caesalpinia sappan, Cynometra* spp., *Dalbergia parviflora, Dialium* spp. (including fruit and tannin), *Hymenaea courbaril* (including fruit), *Intsia palembanica* and *I. bijuga* (pp. 12).

(22) *Koompassia excelsa, K. malaccensis, Parkia javanica, P. speciosa, Pithecellobium jiringa, Pongamia pinnata, Pterocarpus indicus, Saraca* spp., *Sindora* spp. and *Pseudosindora* spp., including notes on minor products (foodstuffs, medicinal, fish poison, oils, honey) (pp. 14).

(23) *Heritiera littoralis, Pterospermum* sp., *Scaphium* spp. (including medicinal uses), *Sterculia* spp. and *Tarrietia simplicifolia* (pp. 6).

1716. Maderas de Chile, sus propriedades y aplicaciones. **[Chilean timbers, their properties and uses.]** *Chile Maderero* 3 (12), 1953 (1–4). [Span.]

Short notes on 15 species.

1717. El lanelo **[*Drimys winteri.*]** *Chile Maderero* 3 (5), 1953 (6). [Span.]

Description of the tree, its distribution, silvicultural characters, and the properties and uses of the wood.

1718. El olivillo **[*Aextoxicon punctatum.*]** *Chile Maderero* 3 (2), 1953 (4). [Span.]

Description of the tree, its distribution, silvicultural characters, and the properties and uses of the wood.

1719. **Timbers of New South Wales: Alpine Ash [*Eucalyptus gigantea*].** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 6 (3/4), 1952 (3–7).

Discusses its structure, uses, and physical, mechanical and seasoning properties.

1720. **Timbers of New South Wales. River Red Gum [*Eucalyptus rostrata*].** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (1), 1953 (3–8).

Includes notes on distribution and ecology, brief botanical and anatomical descriptions, and details of properties and uses.

1721. **The properties of Australian timbers: Mountain Grey Gum [*Eucalyptus goniocalyx*].** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 194, 1953 (8).

1722. WALKER, A. Note sur les palétuviers. **[Mangroves.]** *Rev. int. Bot. appl. Agric. trop.* 33 (369/370), 1953 (360–1). [F.] P.R.

Describes *Rhizophora mangle, R. racemosa, Cassipourea barteri,* and *Avicennia africana,* discusses their uses, and lists native names from French Equatorial Africa.

1723. KEYLWERTH, R. Quaruba. **[*Vochysia* sp.]** *Holz Roh- u. Werkstoff* 11 (9), 1953 (375–6). 10 refs. [G.] P.R.

1724. MAYER-WEGELIN, H. **Poplar wood: properties and uses.** *Transl. For. Prod. Lab., Can.* No. 63, 1953. pp. 11. Transl. by O. Feihl from a reprint from *Das Pappelbuch* (editor H. Hesmer), 1951 [see *For. Abstr.* 13 (No. 118)]. Limited distribution.

1725. WARRING, R. H. **Present-day engineering uses of Lignum Vitae [*Guaiacum officinale*]** *Mechanical World and Engineering Record, London* 133 (3408), 1953 (310–1). P.R.

Describes the physical and mechanical properties of the wood, tabulates the results of a water-absorption test, and analyses the various uses. As a material for bearings, it should not be used in contact with organic solvents. Above 150° F. the guaiac resin may decompose and the wood become friable. A table gives specific applications of the wood in chemical and process industries, and typical mechanical applications. Its handling and working are also briefly described.

1726. **Properties of thinnings of home-grown Sitka Spruce (*Picea sitchensis*). Progress report 1, Consignment No. 761.** Forest Products Research Laboratory, Princes Risborough. 1953. pp. 12 + 9 photos.

Gives data on: rate of growth as shown by ring width; density; wood structure; conversion and quality of converted timber; grading; strength properties; seasoning properties and suitable schedules; durability and preservative treatment; and working properties. The timber proved to be fast-grown, with low sp. gr. The soft early wood, broad in comparison with the late wood, tears when sawn or worked with cutting tools, giving a poor finish. The timber is unsuitable for joinery. There was no appreciable collapse in seasoning, but pressure during preservative treatment caused collapse. Grade-II timber is comparable with Yugoslav Whitewood [*Picea abies*], used for carcassing. Grade-III timber would be suitable for boxes and packing cases, as it works easily and takes nails without splitting.

811. *Structure, Identification*

See also No. 2101.

1727. FREY-WYSSLING, A. Elektronenmikroskopie des Holzes. **[The electron microscopy of wood.]** *Mitt. öst. Ges. Holzforsch.* 5 (5), 1953 (89–90). [G.]

A brief account of the possibilities of electron microscopy in wood-structure research.

1728. KAEISER, M. **Microstructure of the wood of the three species of *Taxodium*.** *Bull. Torrey bot. Cl.* 80 (5), 1953 (415–8). 13 refs. O.B.D.

T. distichum and *T. ascendens* cannot be distinguished from each other on the basis of wood microstructure, and this fact supports the theory that *T. ascendens* may be a variation of *T. distichum*. The wood of *T. mucronatum* can be distinguished by the comparatively thinner horizontal walls of the ray parenchyma cells.

1729. JOHNSTON, D. R. **Structure drawings to 'Specimen Woods', Sheets 28–30.** *Wood* 18 (10–12), 1953 (389; 431; 471).

(28) Idigbo (*Terminalia ivorensis*), East African Olive (*Olea hochstetteri*), Boarwood (*Symphonia globulifera*) and Black Cabbage-Bark (*Lonchocarpus castilloi*); (29) Banak (*Virola koschnyi*), Utile or Mufumbi (*Entandrophragma utile*), Evergreen Oak (*Quercus ilex*), and Mora (*Mora excelsa*); (30) Cramantee (*Guarea excelsa*), American Red Oak (*Quercus* spp.), Nargusta (*Terminalia amazonia*) and Tasmanian Myrtle (*Nothofagus cunninghamii*).

1730. **An atlas of end-grain photomicrographs for the identification of hardwoods.** *Bull. For. Prod. Res., Lond.* No. 26, 1953. pp. iv + 87.

Comprises 396 photomicrographs at × 10 magnification showing the structure of woods dealt with in the lens key already published [see *For. Abstr.* 14 (No. 616)] and intended primarily for use in conjunction with it. The introductory notes include lists of timbers chosen to illustrate the various features used in identification. An index giving botanical and common names of the timbers is appended. *From author's summary.*

1731. PETERSEN, A. E. **A comparison of the secondary xylem elements of certain species of the Amentiferae and Ranales.** *Bull. Torrey bot. Cl.* 80 (5), 1953 (365–84). Numerous refs. O.B.D.

A comparison of the 2 groups shows that the Amentiferae are more specialized than the Ranales in all but 3 of the 25 characters studied. From the point of view of wood anatomy therefore, there is very little to indicate that the Amentiferae are a primitive group.

1732. INGLE, H. D., and DADSWELL, H. E. **The anatomy of the timbers of the south-west Pacific area. III. Myrtaceae.** *Repr.* from *Aust. J. Bot.* 1 (3), 1953 (353–401 + 10 plates + 1 tbl.). 30 refs.

The study covers 32 genera of the Myrtaceae, and the anatomical features of each genus are summarized and tabulated. A grouping of the genera is made on this basis. The affinities of the described genera with those of the New World and the anatomical differences between the Myrtaceae and the closely allied Lecythidaceae are discussed. *From authors' summary.*

811.1. Anatomical Elements and Tissues

See also Nos. 1625, 1756, 1797–8, 2027, 2032.

1733. PILLOW, M. Y., TERRELL, B. Z., and HILLER, C. H. **Patterns of variation in fibril angles in Loblolly Pine.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1935, 1953. pp. 11 + 4 photos + 11 gphs. + 4 tbls. 8 refs. P.R.

Research was conducted on 9 sample trees of 2 age classes, 10–15 and 30–35 years, originating naturally on good sites. In both age classes, a tendency was observed for the fibril angles in normal late wood to decrease for successive rings. Closely spaced trees have smaller angles than widely spaced trees. For closely spaced trees with small crowns, the decrease in fibril angles is sharper in the succession of rings than for widely spaced trees with larger crowns. Increased spacing (release from overtopping trees) results in increased fibril angles.

1734. LIESE, W. Über die Hoftüpfel der Koniferen. **[Bordered pits in the wood of conifers.]** *Ber. dtsch. bot. Ges.* 66 (5), 1953 (202–10). 18 refs. [G.g.] O.B.D.

Discusses, on the basis of previous investigations, the process of blocking in bordered pits, and presents a theory that the function of the pit is to slow down the passage of air in the stem and thus to prevent the formation of air blocks in the water-conducting elements.

1735. LIESE, W., and HARTMANN-FAHNENBROCK, M. Elektronenmikroskopische Untersuchungen über die Hoftüpfel der Nadelhölzer. **[Electron-microscope research on the bordered pits of conifers.]** *Biochimica et Biophysica Acta, Amsterdam* 11 (2), 1953 (190–8). 18 refs. [G.g.e.f.] [Rheinisch-Westfälisches Institut für Übermikroskopie, Düsseldorf.] O.R.S.

Bordered pits of *Picea abies*, *Abies alba*, *Pseudotsuga taxifolia*, *Larix decidua* and *Pinus nigra* var. *calabrica*, were found to resemble closely in structure

those of Scots Pine already described, the only difference being that the warty excrescences present among the circular fibrils of the internal wall in Scots and Corsican Pine are absent in the other species. It is suggested that these excrescences in Pine species may prevent the development of strong adhesive forces between the torus and the inner wall and thus allow the passage of small amounts of liquid even when the pits are closed.

1736. CHEADLE, V. I. **Independent origin of vessels in the monocotyledons and dicotyledons.** *Phytomorphology* 3 (1/2), 1953 (23–44). 51 refs. O.B.D.

Evidence reviewed in this study of the phylogeny of woody dicotyledons and monocotyledons indicates that (1) in the stems of woody dicotyledons vessels arose in the secondary xylem and late metaxylem, metaxylem and protoxylem in succession and specialized in the same spatial sequence, and (2) in monocotyledons the vessels originated in the roots, stems and leaves in succession and specialized in the same sequence; in each organ vessels appeared first in the later-formed metaxylem, and then later in the earlier-formed metaxylem and protoxylem in succession. *From author's summary.*

811.2. Special Features and Abnormal Structure

See also No. 1797.

1737. DIANNELIDIS, T. Zur Frage der Unterscheidbarkeit des Holzes von *Picea* und *Larix* auf Grund der Markstrahl-Harzgänge. **[Differentiation of wood of *Picea* and *Larix* on the basis of resin canals in the rays.]** *Forstwiss. Cbl.* 72 (9/10), 1953 (308–15). 10 refs. [G.g.]

Contrary to the findings hitherto reported there is no significant difference in the number of the epithelial cells in *Larix* and *Picea*; the number of such cells increases with age. The resin canals in the spindle-shaped rays are a little more excentric in *Larix* than in *Picea*, but the difference, on the average, is very small.

811.4. Growth Rings. Early and Late Wood

See Nos. 1759, 1797–8.

811.5. Sapwood and Heartwood

See also No. 1797.

1738. **Factors affecting the formation of heartwood in Douglas Fir (*Pseudotsuga taxifolia*, Britton).** *Rep. B.C. Dep. Lds. For. 1952*, 1953 (36–8).

A study is in progress to determine whether it would be possible by silvicultural measures, to accelerate the formation of heartwood in Douglas Fir. The investigation is not complete, but preliminary results indicate that in all trees studied there is an intermediate zone between the heartwood and sapwood, which is visible to the naked eye. This intermediate zone generally extends from ground level to a point some distance above the top of the heartwood; its maximum width does not occur at the lower levels, but higher up the stem. The moisture content of this intermediate zone was appreciably lower than that of the sapwood, not only along the boundary of the heartwood but also above the top of the heartwood.

1739. BOSSHARD, H. H. Der braune Kern der Esche. Mikroskopische Untersuchungen im verkernten Holz. **[Brown heart of Ash. Microscopic examination of wood that has been transformed into heartwood.]** *Holz Roh- u. Werkstoff* 11 (9), 1953 (349–53). 12 refs. [G.g.] P.R.

The photographs included show the forms of the brown heart: it usually starts in a dry knot in the lower part of the crown, and surrounds the pith nearly down to the butt of the tree; in some cases it spreads from the knot both upwards and downwards, forming a 'knot fork'. The brown deposits in the heartwood zone are almost always found in the food-storage tissues (rays and strand parenchyma), either as 5–7 μ droplets within the cell or as thin coatings on the cell walls. These heartwood deposits are isotropic in polarized light and contain tannins. The 'physiological sapwood' is only 4–6 growth-rings thick near the butt, and ca. 5–10 rings near the crown, and inwards from it the number of tyloses increases rapidly; their wall thickness is ca. 0·5 μ. The brown-heart portions near the knot or the butt have not been found to show any trace of fungal infection.

811.6. Texture. Grain. Figure

See also No. 2021.

1740. BAUMER, M. **Figure in wood.** *Wood* 18 (7; 8), 1953 (259–61; 302–4). 5 refs.

Continues the translation by J. L. Robertson from *Bois For. Trop.* No. 24, 1952 (233–55). [Cf. *For. Abstr.* 14 (No. 3700).]

811.7. *Phloem. Bark*

See also Nos. 1112, 2101.

1741. CHATTAWAY, M. M. **The anatomy of bark. I. The genus *Eucalyptus*.** *Repr.* from *Aust. J. Bot.* 1 (3), 1953 (402–33 + 6 plates). 6 refs.

Cf. *For. Abstr.* 15 (Nos. 633–4).

812. *Physical and Mechanical Properties*

1742. KEYLWERTH, R. Holzeigenschaften von *Pinus maritima*. **[Properties of *P. pinaster* wood.]** *Holz Roh- u. Werkstoff* 11 (9), 1953 (371–2). [G.] P.R.

Mechanical properties in relationship to growth-ring width are tabulated and graphed.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also No. 1952.

1743. LAWSON, D. I., and SIMMS, D. L. **The ignition of wood by radiation.** *British Journal of Applied Physics, London* 3 (9), 1952 (288–92). 5 refs. X.

The minimum intensities of irradiation required to ignite wood, with and without the presence of a pilot flame, have been determined, and found to be approximately constant for nearly all six species tried. Empirical expressions have been obtained which relate the time taken to ignite with the intensity of irradiation and the oven-dry density of

the wood for these two types of ignition. *Authors' summary.*

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 1734–5, 1764, 1797–8, 1952, 1990, 1994, 1996, 2024, 2056.

1744. Samborski, M. R., Tsoumis, G. T., and Wangaard, F. F. **Moisture absorption in certain tropical American woods (revised).** *Tech. Rep. Yale Sch. For.* No. 8, 1953. pp. 6 + 14 gphs. + 3 tbls.

Supplements and summarizes an earlier report of the same title. [See *For. Abstr.* 11 (No. 1863).]

1745. Jeżewski, M. O określaniu wilgotności drewna przy pomocy pomiarów elektrycznych i o nowym aparacie do mierzenia wilgotności. **[Determination of wood moisture content by electrical measurements, and a new apparatus for measuring moisture content.]** *Prace rol.-leśn. polsk. Akad. Um.* No. 71, 1953. pp. 32. 6 refs. [Pol.pol.e.russ.]

Illustrated description of the design, construction and operation of an apparatus measuring the electrical capacity of wood samples, using the resonance method. The results do not give direct moisture content (%) values, but can yield the absolute water content (in g.) by means of a calibration curve. If the weight of wood is also known, the m.c. (%) can be easily evaluated. The results obtained are accurate up to m.c. of 100% when the error is $\leqslant 1\%$.

1746. Elektrogeräte zur Bestimmung der Holzfeuchtigkeit. **[Electrical appliances for determining wood moisture.]** *Holztechnik* 33 (9), 1953 (440–2). [G.] P.R.

Describes 5 appliances currently manufactured and used in Germany, viz. 3 resistance-type and 2 dielectric-constant type, and compares their readings with the results of the drying-oven method.

1747. Vodoz, J. Le retrait et le gonflement du bois. **[The shrinkage and swelling of wood.]** *Schweiz. Z. Forstw.* 104 (10), 1953 (508–17). 5 refs. [F.g.]

Reviews current theories on the subject (the 5 references cited include a work by the author with a bibliography of 76 refs. [cf. *For. Abstr.* 14 (No. 645)]). His own experiments lead him to conclude that longitudinal shrinkage is strongly influenced by the shape of the test specimens.

1748. Stevens, W. C. **The effect of temperature and drying rate on the shrinkage of Beech.** *Timber News* 60 (2162), 1952 (585–7); *Timber Technol.* 61 (2163), 1953 (27–8). 5 refs.

Presents results of tests at Princes Risborough on specimens of English-grown Beech. Shrinkage was found to be considerably influenced by the temperature of drying: it increased with increasing temperature under longer drying schedules, but decreased slightly with increasing temperature in fast drying.

1749. Stevens, W. C. **The shrinkage of Beech at high and low temperatures.** *Timber Technol.* 61 (2171), 1953 (427–8). 3 refs.

Presents results of shrinkage measurements on thin, tangentially cut samples of Beech at various stages of drying. The total shrinkage of the samples dried at 70° C. from the green condition was ca. 15·5%, while for 25° it was only ca. 11·0%. The linear relationship between shrinkage and moisture content was observed for the range 45–0% m.c. when dried at 70°, and for the range 27–0% m.c. at 25°.

1750. Ullrich, H. Über das Quellungsverhalten von Holz als Substanz mit Ultrafilterstruktur in Abhängigkeit von Grösse und Bau der Quellungsmittelmoleküle. **[Swelling of wood as a substance with an ultra-filtration structure, in relation to the size and structure of the molecule of the swelling agent.]** *Planta* 42 (1/2), 1953 (129–39). 19 refs. [G.g.] O.B.D.

Tests with primary aliphatic alcohols C_1–C_6 (in the absence of water) showed an inverse relationship between increasing chain length and the rate and degree of final swelling of the wood. Iso-alcohols had a weaker swelling effect than the normal forms. Of other substances tested, water gave the greatest degree of swelling, followed by 1,4-dioxane and glycerine in that order.

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 1444, 1657, 1755, 1797–8, 1990, 1993, 1995–6, 2027.

1751. **Methods of determining the specific gravity of wood.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. *B*–14 (rev.) 1952. pp. 4 + 1 dgm. P.R.

1752. **Weights of various woods grown in the United States.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. 218 (rev.) 1952. pp. 8. P.R.

Tabulates: (1) sp. gr. of sawn wood of a number of species under different conditions of moisture; (2) average m.c. and sp. gr. of some green timbers; (3) sapwood as % of roundwood volume, and (4) weight of green wood of various sp. gr. and m.c.

1753. Susmel, L. Ricerche sul peso specifico del legno di *Eucalyptus rostrata* Schlecht. dell'Agro Pontino. **[The specific gravity of *E. rostrata* wood from the Pontine Campagna.]** *Ital. for. mont.* 8 (5), 1953 (222–7). 7 refs. [It.it.f.]

The test specimens came from 26 trees, 11–12 years old, from 3 shelterbelts. Oven-dry density varied from 0·535 to 1·144 g./c.c. (mean value 0·879). Inner heartwood was almost always lighter than sapwood. In trees of the same height, sp. gr. increased in inverse proportion to tree diameter, and in trees of the same diameter it increased in inverse proportion to tree height. Sp. gr., in fact, is an inverse function of rate of growth and thus of soil fertility.

1754. Nylinder, P. Über die Verteilung von Rohwichte und Holzfeuchtigkeit in Kiefern- und Fichtenstämmen und ihre Bedeutung für die Flösserei in Schweden. **[Distribution of density and moisture content in Pine and Spruce stems and its significance for timber floating in Sweden.]** *Holz Roh- u. Werkstoff* 11 (9), 1953 (354–61). 3 refs. [G.g.] P.R.

Presents in the form of graphs and tables some results of an investigation initiated by Statens Skogsforskningsinstitut into the sinking of logs [cf. *For. Abstr.* 13 (No. 3441)]. It has been found

that the moisture content of the woods tested is subject to diurnal and seasonal variations; it also depends on the oven-dry density of wood, the stem diameter and the position within the tree. [Cf. *For. Abstr.* 15 (No. 1444).]

812.7. Strength Properties

See also Nos. 1742, 1797, 1822–3, 1856–7, 1899, 1972, 1990.

1755. Armstrong, F. H. **The strength properties of timber.** *Bull. For. Prod. Res., Lond.* No. 28, 1953. pp. 41. 2 refs. Price 2*s*. P.R.

Presents strength data from standard tests, made at Princes Risborough over the past 25 years, of 122 native-grown and imported softwoods and hardwoods. Methods of test used for small clear specimens of timber, as well as explanations of the various strength properties, are outlined. The influence of several factors upon strength is discussed and the relationships between the strength properties and specific gravity, or density, are examined. Comparison of species and the assessment of their utilization value are afforded by means of diagrams. *From author's summary.*

1756. Frey-Wyssling, A. Über den Feinbau der Stauchlinien in überbeanspruchtem Holz. [**Fine structure of slip lines in overstressed wood.**] *Holz Roh- u. Werkstoff* 11 (7), 1953 (283–8). 16 refs. [G.g.] P.R.

Both the macro- and micro-slip lines in wood are caused by shearing stresses which work diagonally during compression. These lines are not ruptures but only a loosening of texture, the strand elements being bent in the form of an S. In the macro-slip lines, the elements are the tracheid strands or even single tracheids whereas in the micro-slip lines the slip occurs in the cell wall, the microfibril bundles sliding apart. Since the micro-slip lines occur at lower loads than the macro-lines, the internal cohesion of the microfibrils in the wood tracheids appears to be weaker than the strength of the middle layer. In an isotropic material, the slip lines ought to make an angle of 45° with the axis; a systematically greater angle has been observed in wood for both the macro- and micro-slip lines. Owing to the (annual) ring structure of wood, the buckling of the strand elements always takes place in a tangential direction. Radial buckling is observed in the microfibrils of the stout secondary walls of textile fibres. *From author's summary.*

1757. Drow, J. T. **Strength of Western Larch [*Larix occidentalis*] and its suitability for poles.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1758 (rev.) 1952. pp. 3 + 1 gph. 3 refs. P.R.

Cf. *For. Abstr.* 11 (No. 1098).

1758. Siemiński, R. **Investigation of the technological properties of narrow-ringed common Pine heartwood (*Pinus sylvestris*).** *C.R. Sci. math. nat. Acad. polon.* Nos. 5/10, 1951 (1952), (72). [E.] O.R.S.

In an attempt to discover whether Pine heartwood (h.w.) should be rejected for aircraft construction, tests were made on timber from trees 97–180 years old from different parts of Poland. Test pieces, across and along the grain, were cut from sapwood (s.w.) and h.w. and were tested for compression, tension, bending, and shear strengths, and shear in the glued joint. Properties tested included hardness, sp. gr., proportion of late wood and resin content. A statistical analysis of the results showed no appreciable difference in strength between h.w. and s.w. Radially the highest strength was found in the h.w. nearest the s.w. and strength decreased in the order inner s.w., h.w. nearest the pith, and s.w. nearest the bark. Strength decreased steadily with increasing height from the ground. Black heart [blue stain?] and resin contents up to 22% (based on dry matter of timber) appeared to have no effect on the strength of timber and joints. [Cf. *For. Abstr.* 15 (No. 665).]

1759. Pechmann, H. v. Untersuchungen über die Bruchschlagarbeit von Rotbuchenholz. [**Investigations on the total work in impact bending of Beech wood.**] *Holz Roh- u. Werkstoff.* 11 (9), 1953 (361–7). 8 refs. [G.g.] P.R.

Presents the results of impact bending tests on a number of stem disks from trees of different origin. Their average values varied from 0·705 to 1·151 m.kg./sq. cm. A correlation with site class has been established, although relatively low strength values are sometimes found from good site classes. For good classes (high strength values) the frequency and strength maxima are observed from the ring-width range 1·5–2 mm., but wider (up to 4 mm.) rings do not necessarily bring about a strength reduction; on the other hand, very narrow rings do so. The scatter of values is nearly as great in the diagram representing the green density/total impact-bending work relationship as for the growth-ring width/bending work relationship. Given the same density, trees from better sites show greater strength values than those from poorer sites. The variations within a stem are sometimes very great: thus impact-bending work values of 0·388 and 1·444 m. kg./sq. cm. have been found in a stem disk for which the compression strength varies from 387 to 687 kg./sq. cm. High values for impact-bending work accompany high tension-wood proportions. Frequency polygons for the fibre-wall thickness of Beech wood from different sites have shown that wood from better sites, characterized by higher impact-bending strength, has thicker fibre-walls (modal values 0·004–0·0045 mm.), than wood from poorer sites (modal values 0·0022–0·0045 mm.).

1760. Saito, Y., and Kitahara, K. [**The mechanical properties of bent wood tested by Thonet's method.**] *Wood Ind., Tokyo* 8 (11), 1953 (485, 501–4). [Jap.e.] P.R.

Compression and shear strength were tested on samples [relative dimensions and positions are illustrated] from bent wood, diam. 25·5 and 35·3 cm., cross-section 4 × 4 cm. The species used was *Fagus crenata.* The results are shown in tables and graphs, and the types of structure and the appearance of the wood structure after testing in diagrams and photographs [all with English legends]. Average values for compressive strength of the wood bent to the smaller radius were the same for the samples from both the inner and outer side of the bend as

for unbent wood, but the standard deviation [S.D.] for the inner samples was greater. Compared with unbent wood, values for the wood bent to the larger radius were smaller. S.D.s for samples from the outer side and from the middle were the same and that for the inner sample was greater. Average shear strength values for both inner and outer samples were smaller than for the unbent wood and the S.D.s were greater. *From authors' summary.*

1761. MAWBY, M. **Project No. TM 14. Sub project 14–1. Progress report No. 2, Development of dynamic hardness measurement methods for wood.** Division of Wood Technology, Forestry Commission, New South Wales, Sydney. 1952. pp. 3. 1 ref. P.R.

Presents the results of hardness tests for *Ceratopetalum apetalum* and *Litsea reticulata* conducted by the ball-drop and Janka methods.

1762. DACRE, J. C. **A note on the shear-strength values of some New Zealand plywoods.** *N.Z. J. Sci. Technol.* 34*B* (4), 1953 (257–9). P.R.

Tabulates average dry and wet shear-strength values for different species of New Zealand 3-plies bonded with a lime-casein glue (219 specimens) and a synthetic phenol-formaldehyde glue (39 specimen panels).

1763. KASEI, S. **[A method of testing cleavage in wood [under impact loading].]** *Wood Ind., Tokyo* 8 (11), 1953 (485, 498–500). 5 refs. [Jap.e.] P.R.

The apparatus [illustrated] consists of a wedge of ground steel, with a wedge angle of 30°, weighing 0·9 kg. The test piece of wood is split by the kinetic energy of the falling wedge and the energy consumed in splitting the wood is calculated from the difference in the width of notch made by the wedge in a thick lead plate beneath the test piece as compared with the notch made by the wedge when no test piece is present. *From author's summary.*

1764. MINAMI, Y. **[Torsion tests on wood.]** *Wood Ind., Tokyo* 8 (1), 1953 (1, 31–4). 6 refs. [Jap.e.] P.R.

The effect of moisture content on torsion strength is similar to that on bending and compression strengths and can be expressed, below fibre-saturation point, by the empirical formulae $\tau = \alpha \times 10^{-\beta m}$ and $G = k \times 10^{-lm}$ where τ is the torsional strength, G the modulus of rigidity, m the % m.c. and α, β, k and l are constants varying with the timber species. At 15% m.c. a moisture increase of 1% causes a reduction of 1·2–2·2% in strength and 1·7–2·2% in modulus of rigidity. The damping [hysteresis?] curves in static reversed torsion are analogous to those for metals, and damping capacity [work loss?] is connected with the maximum stress τ by the formula $D = p\tau^q$. The higher the m.c., the larger the damping capacity [work loss?] and the coefficient p can be expressed as $p = Am^B$; A, B, and q are constants. The effect of moisture corresponds to the effect of heat on metals. [Results are shown in graphs with English legends.] *From author's summary.*

812.8. Workability. Working Properties

1765. ANTOINE, R. Étude générale de l'usinage des bois. **[A study of the conversion of [Congolese] timbers.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (387–8).

A study was made of several species to determine for each (1) angle of attack and (2) optimum speed of sawing. These data are given for *Ongokea gore*, *Entandrophragma cylindricum*, *E. utile*, *Celtis* sp., *C. zenkeri*, *Phialodiscus plurijugatus*, and *Sarcocephalus diderrichii*.

813. *Wood Chemistry*

See also Nos. 1927–8, 1930–2, 1972, 2030 *et seq.*, 2101.

1766. ENKVIST, T. Träkemi vid världskongressen i Stockholm. **[Wood chemistry at the World Congress at Stockholm.]** *Pap. ja Puu* 35 (9), 1953 (356–8). [Sw.] P.R.

Lists the speakers with a brief indication of the subjects covered [cf. *For. Abstr.* 14 (p. 240)].

1767. **Chemical analyses of wood.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. 235 (rev.) 1952. pp. 4. P.R.

Describes the kind of information obtainable from the specific chemical determination of different wood constituents.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

1768. KRATZL, K. Über den qualitativen Nachweis der Verholzung. **[Qualitative detection of lignification.]** *Holz Roh- u. Werkstoff* 11 (7), 1953 (269–76). 65 refs. [G.g.] P.R.

A detailed survey of the author's and other papers on botanical staining methods, conventional chemical (acid-lignin) methods, and infra-red spectroscopy applied to microscopic sections.

1769. FREUDENBERG, K. Zur Biogenese des Lignins. **[The biogenesis of lignin.]** *Holz Roh- u. Werkstoff* 11 (7), 1953 (267–9). [G.g.] P.R.

Cf. *For. Abstr.* 14 (No. 1522).

1770. TREIBER, E., LANG, W., and FLORIANTSCHITSCH, M. Die Ultraviolettabsorption einiger Cambialsäfte. **[The ultra-violet absorption of some cambium saps.]** *Protoplasma, Wien* 41 (4), 1952 (452–7). 14 refs. [G.] [Universität Graz.] O.R.S.

The absorption spectra were determined from expressed sap from the cambium of Spruce, Beech, *Syringa vulgaris*, *Acer platanoides* and *Ginkgo biloba*. These saps should contain the chemical structural units of lignin. The absorption curve of sap from Spruce was almost identical with that of coniferin. Those of the sap and a bark extract of *Syringa vulgaris* were identifiable with syringin, but that of *Acer platanoides* was not a pure syringin type. Those of Beech and *Ginkgo biloba* were not simply identifiable and may represent mixtures.

1771. HIGUCHI, T., KAWAMURA, I., and ISHIKAWA, H. **[The formation of lignin in Bamboo shoots.]** *J. Jap. For. Soc.* 35 (8), 1953 (258–63). 12 refs. [Jap.jap.e.]

(1) Mäule and phloroglucinol-HCl tests on cross-sections of shoots from *Phyllostachys edulis* and *P. nigra* var. *henonis* gave positive reactions round the spirally-thickened vessel at the apex of the shoot,

and the reaction extended into the vascular bundle beyond the vessels in the older parts. No reaction was obtained with parenchyma tissue outside the vascular bundle, in Bamboo shoots less than about 5 m. high. (2) Tests for the presence of β-glucosidase and phenoloxidase gave positive results in the regions showing the lignin reaction. (3) Experiments demonstrated that β-glucosidase is similar to emulsin and that phenoloxidase has a laccase character. (4) The activity of these enzymes was most intense at the base of the shoot, suggesting a relationship between lignification and enzyme action [cf. *For. Abstr.* 14 (No. 1522)]. (5) A determination of lignin and of its methoxyl content at different points in the shoot showed that the methoxyl content was lowest in the upper part of the shoot. [Tables and illustrations have English legends.] *From authors' summary.*

1772. HARRIS, E. E. **A lignin-carbohydrate bond in wood.** *Tappi* 36 (9), 1953 (402–5). 35 refs. P.R.

Attempts at fractionating wood into carbohydrate and lignin by grinding and sifting, conducted at Madison, showed that lignin was concentrated in the finest fraction, but all fractions contained substantial quantities of lignin. About 70% of the lignin in Aspen and Maple, and 24% in Spruce, dissolved in 20 volumes of methanol containing 2% of HCl, in 48 hours. Treatment of wood with a 17·5% solution of alkali made ca. 70% of the lignin in the hardwoods, and ca. 30% of the lignin in the Spruce, soluble in methanol after removal of the alkali.

1773. SMITH, M. A., CELMER, F., KRAUT, J., WIKTOSKI, F. C., and ZUCKERMANN, P. **Concerning the Russell formula for gymnosperm lignin.** *Tappi* 36 (8), 1953 (342–5). 21 refs. P.R.

Results of the reactions of periodate lignin from *Picea mariana* indicate that the Russell formula does not satisfactorily account for the properties of this substance.

1774. MEREWETHER, J. W. T. **Studies on the lignin of *Eucalyptus regnans* F. Muell. IX. The precipitation of alkali lignin with carbon dioxide.** *Aust. J. appl. Sci.* 4 (3), 1953 (444–50). 10 refs. P.R.

When (1) precipitated with CO_2 to pH 9, then (2) with CO_2 to pH 8, then (3) concentrated to 1/3 followed by recarbonation, and finally (4) precipitated with H_2SO_4, the *E. regnans* soda black liquor yielded 4 fractions of alkali lignin. When fractionated further by organic solvents, the 3 fractions obtained with CO_2 yielded substantially the same alkali lignin-A and alkali lignin-B as those previously isolated. Addition of H_2SO_4 to the filtrate from carbonation of black liquor gives fractions lower in C and OCH_3. *From author's summary.*

1775. ZENTNER, T. G. **A study of the reaction products of lignin model compounds and sodium hydrosulphide.** *Tappi* 36 (11), 1953 (517–23). 9 refs. P.R.

In addition to the guaiacyl nucleus, a number of lignin model compounds have revealed 4 types of functional groups: carbonyl group, conjugated double bond, ether linkage, and aliphatic hydroxyl group, only the last of which reacted with NaHS to form a S derivative.

1776. MARK, H. Einige Fortschritte in der Chemie der Cellulose. **[Advances in cellulose chemistry.]** *Holz Roh- u. Werkstoff* 11 (7), 1953 (257–60). 22 refs. [G.g.] P.R.

1777. STAUDINGER, H. Rückblicke und Ausblicke auf die Konstitutionsaufklärung der Cellulose. **[Retrospect and prospects in the elucidation of the constitution of cellulose.]** *Holz Roh- u. Werkstoff* 11 (7), 1953 (260–2). 23 refs. [G.] P.R.

1778. BROWNING, B. L., and BUBLITZ, L. O. **The isolation of holocellulose from wood.** *Tappi* 36 (10), 1953 (452–8). 24 refs. P.R.

Less carbohydrate is lost in the analytical preparation of holocellulose from *Picea mariana* by the Cl_2-monoethanolamine method (I), than in the isolation of holocellulose by the chlorite method (II). If partial II is followed by I, the carbohydrate loss exceeds that from either separately. Ultraviolet absorption tests of the lignin filtrates show that acid-soluble lignin is present in all delignified products, particularly in woods partly delignified by acidified chlorite.

1779. FOSTER, D. H. **Reactivity of wood cellulose. Treatment with dilute sulphuric acid at elevated temperatures.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 1952 (76–85 + 1 photo + 1 gph). 27 refs. P.R.

Gives the results of tests on the rate of hydrolysis of cellulose (holocellulose from samples of *Eucalyptus regnans*, and bleached Eucalypt soda pulp) by 2% H_2SO_4 at 160° C. The only appreciable difference in Eucalypt holocellulose behaviour was between tension-wood and normal-wood cellulose, the former hydrolysing much more slowly.

1780. RÅNBY, B. G. Quelques points de vue sur les fibres de la cellulose de bois et leur emploi technique. **[Some points of view regarding the cellulose fibres of wood and their technological utilization.]** *Bulletin, Association Technique de l'Industrie Papetière, Paris* 6 (3), 1952 (78–89). 16 refs. [F.f.] L.S.

α-Cellulose of bleached pulp consists of micellary filaments ca. 80 Å wide; β-cellulose is a mixture of short fragments of these filaments with small particles of ca. 100–150 Å diam.; γ-cellulose is amorphous and contains no filaments.

1781. KRATKY, O. Form und Grösse der Micelle regenerierter Cellulose. **[Shape and size of the micelle of regenerated cellulose.]** *Holz Roh- u. Werkstoff* 11 (7), 1953 (263–7). 31 refs. [G.g.] P.R.

A review of literature.

1782. ROUDIER, A. Les acides uroniques et aldobiuroniques séparés par hydrolyse acide de la paille de blé et de certains bois d'arbres angiospermes. **[Uronic and aldobiuronic acids separated by acid hydrolysis from wheat straw and angiosperm trees.]** *C.R. Acad. Sci., Paris* 237 (13), 1953 (662–3). [F.] O.R.S.

Three aldobiuronic acids were obtained from the acid hydrolysate of straw: (I) monomethyl-glucuronic acid and xylose, (II) glucuronic acid and xylose and (III) glucuronic acid and galactose.

(I) and (II) were identified as 3α-[monomethyl-D-glucuronosyl]-D-xylose and 3α-[D-glucuronosyl]-D-xylose respectively, and (III) in chromatogram resembled the acid extracted from gum arabic, [6-β-(D-glucuronosyl) - D - galactose]. Chromatograms from Poplar, Lime and Aspen showed the presence of a monomethyl-glucuronic acid resembling (I). There was nothing corresponding to the position of (II), but between it and (III) there was a substance containing less uronic acid than (II), and suggesting a completely different constitution. It is concluded that differences exist between the constitution of hemicelluloses of straw and of angiosperm trees.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also No. 2038.

1783. KING, F. E. **The chemistry of wood extractives.** *Chem. & Ind.* 1953 (50), (1325–8). 27 refs. P.R.

A survey of recent papers by the author and coworkers.

1784. ERDTMAN, H. Über einige Inhaltsstoffe des Kernholzes der Coniferenordnung Pinales. Ihre taxonomische, physiologische und biochemische Bedeutung. **[Some extractives in the heartwood of the order Pinales. Their taxonomic, physiological and biochemical significance.]** *Holz Roh- u. Werkstoff* 11 (7), 1953 (245–51). 58 refs. [G.g.] P.R.

Some extractives found in coniferous woods seem to be of interest for the problem of conifer evolution. All Pines contain, e.g., phenolic derivatives of stilbene (pinosylvin) and flavonoid substances. Quite characteristic and biochemically interesting differences are observed in this respect between the two subgenera *Haploxylon* and *Diploxylon*.

1785. ANDERSON, A. B. **Occurrence of cinnamic acid in Sugar Pine (*Pinus lambertiana* Dougl.).** *J. Amer. chem. Soc.* 74 (23), 1952 (6099). [University of California, Berkeley, Calif.] O.R.S.

The acid was found in various heartwood sections from the bole of the tree, the largest quantity (i.e. 3·20 g. from 400 g. of heartwood) being obtained in the stumpwood area.

1786. KURTH, E. F., and BECKER, E. L. **The chemical nature of the extractives from Red Alder.** *Tappi* 36 (10), 1953 (461–6). 12 refs. P.R.

The bark of *Alnus rubra* has been found to contain 24·0% of extractives, its wood 8·6%. The main white colouring matters in the bark are alnulin and protalnulin; the red colouring matters are a phenolic xyloside, phlobatannin, a tannin-carbohydrate complex, and phlobaphene. The tannin contents are 4·2% in the bark and 0·74% in the wood.

1787. BROWNING, B. L., and BUBLITZ, L. O. **Extractives of Aspen wood and bark.** *Tappi* 36 (9), 1953 (418–9). 6 refs. P.R.

The ether-soluble portion of extractives is characterized by a high content of fatty acids and contributes to the formation of hardwood pitch. Seasoning decreases the ether-soluble material in both wood and bark.

1788. KING, F. E., COTTERILL, C. B., GODSON, D. H., JURD, L., and KING, T. J. **The chemistry of extractives from hardwoods. Part XIII. Colourless compounds of *Pterocarpus* species.** *J. chem. Soc.* Nov., 1953 (3693–7). [The University, Nottingham.] O.R.S.

An examination of the heartwood of *P. dalbergioides*, *P. macrocarpus*, *P. soyauxii*, and *P. tinctorius* revealed more general occurrence of pterocarpin, homopterocarpin, and pterostilbene, previously isolated from *P. santolinus*. None of these products was detected in *P. angolensis* which is also atypical in containing angolensin and prunetin. *From authors' summary.*

1789. KATHPALIA, Y. P., and DUTT, S. **Chemical examination of the fixed oil derived from the wood of *Dalbergia sissoo* Roxb.** *Indian Soap Journal, Calcutta* 17 (10), 1952 (235–7). 1 ref. L.S.

A light-brown viscous oil in a yield of 5·35% has been isolated from the heartwood of *D. sissoo*. The contents of 6 main constituents are given.

1790. KATHPALIA, Y. P., and DUTT, S. **Chemical examination of the essential oil derived from the wood of *Dalbergia sissoo* Roxb.** *Indian Soap Journal, Calcutta* 17 (12), 1952 (285–7). L.S.

Chemical examination of the pale yellow, mobile, aromatic-smelling oil isolated from the heartwood of *D. sissoo* in a yield of 0·24% revealed the presence of 2 sesquiterpene derivatives: bisabolene (9·98%) and nerolidol (66·40%).

1791. HASEGAWA, M., and SHIRATO, T. **Flavonoids of various *Prunus* species. The flavonoids in the wood of *Prunus yedoensis*.** *J. Amer. chem. Soc.* 74 (23), 1952 (6114–5). [Government Forest Experiment Station, Meguro, Tokyo.] O.R.S.

Genkwanin, naringenin, and *d*-catechin were found in the heartwood, and *d*-catechin and a new glucoside of naringenin in the sapwood.

1792. WOLCOTT, G. N. **Termite-repellent wood extractives.** *Journal of Agriculture of the University of Puerto Rico, Río Piedras* 37 (3), 1953 (224–7). 3 refs. [E.e.span.] I.M.I.

Briefly reviews present knowledge of the chemical constituents of wood that are toxic or repellent to termites. In work on *Swietenia mahagoni* at the University of Puerto Rico a substance extracted by means of ether petroleum was found to give complete protection against termite attack. The chemical composition and properties of this substance are being investigated.

813.3. Ash Constituents

1793. KUROYANGI, S. **[Spectrochemical studies of woods and trees. III. The qualitative analysis of the chemical elements of woods and trees by emission spectroscopy.]** *Scientific Reports of the Faculty of Agriculture, Okayama University, Okayama, Japan* No. 2, 1953 (92–106 + 1 tbl.). 11 refs. [Jap.jap.e.]

(1) Spectra of green wood and of various parts of the living tree were lighter than those of their ash, but determination of Fe, B, Si, P, Mg, Mn, Al, Ca, Cu, Na, Ti and K was possible. (2) In the wood, little variation occurred in content of inorganic substances with species, sp. gr., early and late wood,

heartwood and sapwood or normal and compression wood. (3) There was little difference in the results of qualitative analysis between different parts of the tree, but the leaves and bark contained more Si, Mn, Mg, Ca and P than other parts. (4) Inorganic elements in the forest soil were closely related to those in the leaves of trees on the site. *From author's summary.*

813.4. Chemical Effects of Heat. Chemistry of Thermal Decomposition

See also No. 1952.

1794. GILLET, A., and URLINGS, J. Pyrolyse comparée du bois, de la cellulose, de la lignine et des houilles. 2e partie. Du bois à la houille. [**Comparative pyrolysis of wood, cellulose, lignin, and coals. Pt. 2. From wood to coal.**] *Chim. et Industr.* 70 (1), 1953 (64). [F.] D.S.I.R.

Additional material to a previous paper. [Cf. *For. Abstr.* 14 (No. 2654).]

813.8. Poisonous and Irritant Properties

1795. JONES, I. **Dermatitis—causes and prevention.** *Report, Technical Information Service, Furniture Development Council, London* No. 6 [1953?]. pp. 15.

The main causes are chemicals (adhesives, especially synthetic resins and finishes) but a list is given of 18 timbers containing irritants that may affect nose, throat, eyes and skin. Methods of reducing risk of dermatitis in factories are discussed.

814. *Natural Durability. Old Wood. Fossilized Wood*

See also Nos. 1130–1, 1914, 1980.

1796. CHOWDHURY, K. A., and GHOSH, S. S. **Plant remains from Harappā 1946.** *Repr.* from *Ancient India, Delhi* No. 7, 1951 (3–19 + 4 plates).

Fragments of wood excavated in 1946 have been identified as (1) *Cedrus deodara*, (2) *Dalbergia latifolia*, (3) *Zizyphus* sp., and (4) *Ulmus* sp.

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 1733, 1753, 1758–9.

1797. PAUL, B. H. **Variability in wood of southern Pines as influenced by silvicultural practices.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1923, 1952. pp. 10. P.R.

Describes the effect of soil type and moisture, growing-space, pruning, and stand structure (in mixed stands) on the following wood characteristics: width of rings, variation of density in early and late wood, formation of heartwood, shrinkage, compression wood, strength/density relationship, and some anatomical features.

1798. NYLINDER, P. Volymviktsvariationer hos planterad gran. [**Variations in [wood] density of planted Norway Spruce.**] *Medd. SkogsforsknInst., Stockh.* 43 (3), 1953. pp. 43 + 1 tbl. 48 refs. [Sw.sw.e.] Price *Kr.*3.

Samples were taken at different heights in the tree from 53 felled sample trees from a 50-year-old stand. (1) The following observations were made on variations in moisture content: (*a*) The marked seasonal variation in m.c. appeared to be neither simultaneous nor similar at different heights or in different parts of the sapwood (s.w.). The greatest seasonal variation occurred in the inner s.w.; no seasonal variation was found in the heartwood (h.w.). (*b*) The m.c. of the s.w. decreased from the stump to about 10% of the tree's height and then increased continuously to the top. (*c*) In cross-sections, m.c. decreased continuously from the outer to the inner s.w., with a considerable reduction from inner s.w. to h.w. (*d*) Fast growing wood with wide growth rings had a greater m.c. than slow growing wood with narrow rings; thus wood with a low dry density generally had a higher m.c. than that with a high dry density. (*e*) M.c. in the outer s.w. appeared to be lower, though not significantly so, on the S. than on the N. side. (*f*) The volume of air as a % of the volume of wood in similar radial positions in the tree seemed to be fairly constant for different heights in the tree within trees and also between trees of different diameters at the same time of year. (*g*) Variations in green density with season and position in the stem largely corresponded with variations in m.c. (*h*) In the material tested, average green densities were: h.w. 0·59, inner s.w. 0·89, and outer s.w. 1·09 g./c.c. (2) The following observations were made on oven-dry density (o.d.d.). (i) The range of densities in the material corresponded closely with a normal curve. (ii) In cross-sections the o.d.d. decreased from pith to outer h.w. and then increased markedly to the outer s.w. (iii) In the s.w. the o.d.d. increased with height to 10% of the tree height, then decreased to about 80% of height, and then increased slightly. In the h.w. it decreased to about 30% of height and then increased steadily to the top. (iv) In the outer s.w. the mean o.d.d. was somewhat higher on the N. than on the S. side. (v) Equations were deduced for the relationship between o.d.d. and late-wood proportions, annual-ring width, positions in stem and tree diameter. (vi) It was found that, within the stands, in trees of the same annual-ring width and proportion of late wood, trees of medium diameter had a rather higher density than those with larger or smaller diameters. (3) General studies on wood structure showed that: (*a*) in the outer s.w. the width of any given annual ring decreased up the stem to about 10% of the tree's height, followed by a steady increase to the top, with similar variations in the rest of the s.w., and only small differences in the outer and very irregular variations in the inner h.w.; (*b*) the late-wood proportion varied inversely with the width of the ring, but in the inner h.w. smaller trees with narrow rings had less late wood than the medium and larger trees; and (4) average radial and tangential cell breadth increased with distance from the pith, and the cells changed in shape, being broader radially than tangentially near the pith, and becoming square and broader tangentially then radially near the cambium. Results are given in tables and graphs with English legends.

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

1799. **The building exhibition: woodworking machinery to be shown at Olympia.** *Timb. Tr. J.* 207 (4027), 1953 (1208–17).

Describes briefly with some illustrations examples of machinery to be shown by about 12 of the firms exhibiting.

1800. **At the Building Exhibition: woodworking machinery and ancillary equipment: some further information.** *Timb. Tr. J.* 207 (4028), 1953 (1420*a*–1420*c*).

Describes with some illustrations machinery exhibited by 8 firms at the exhibition at Olympia, Nov./Dec., 1953.

1801. SHERLOCK, F. E. **Special purpose woodworking machines—(1) The Linderman jointer. (2) The automatic stroke moulding sander. (3) The pattern miller. (4, 5) The automatic spindle shapers. (6, 7) Automatic lathes. (8) The horizontal spindle. (9) Line production of floor blocks.** *Wood* 18 (2–9; 12), 1953 (76–8; 114–6; 158–61; 196–8; 234–7; 280–2; 314–6; 358–60; 480–3).

1802. **Hard metal tools applied to wood machining.** *Woodwkg. Ind.* 10 (3), 1953 (163–5, 174). P.R.

A general account.

1803. ENGLESSON, T. Lönsamheten av högvärdiga eggmaterial. **[The profitability of high-grade material for cutting edges.]** *Medd. svenska Träforskn-Inst. (Trätekn. Avd.)* No. 35*B*, 1952. pp. 7 + 4 gphs. + 3 tbls. [Sw.] P.R.

Discusses tests on various materials for cutting edges and concludes that the newer hardened metals (e.g. the carbides) are economical, because of their longer life, in spite of initial cost and greater difficulty in sharpening.

1804. MAYER, K. Produktivitätssteigerung durch Hartmetallwerkzeuge. **[Increase in productivity through the use of carbide tools.]** *Int. Holzmarkt* 43 (18), 1952 (35–6). [G.]

Tabulates figures showing saving in cost in sawing and milling for specific instances (plywood and glued furniture), showing the timber species concerned and glue used.

1805. CUNNINGHAM, B. M. **Maintenance of wood shop equipment.** *Abstr. of thesis* in *Dissert. Abstr.* 13 (4), 1953 (498–9). O.R.S.

A detailed account of equipment and methods used in maintaining woodworking tools (including planes, saws, lathes, jointers, sanders, shapers), motors and auxiliary equipment.

821. *Barking*

See also Nos. 1404, 1408–11, 2025.

1806. IVORY, E. P. **Log barking for greater profit.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (54–5, 94).

Describes 2 types of barking machine (cutting and hydraulic) used by the Ivory Pine Company of California, tabulates results of chemical analyses of bark of Sugar and Ponderosa Pines, and discusses its potential use as a soil improver, and in the chemical industries as a source of methanol and isopropanol, extracted by solvents.

1807. FLATEBOE, E. I. **Hydraulic log barking.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (56–8, 94).

Describes different types of hydraulic barker including slab barkers, and discusses the advantages of hydraulic barking, water consumption and costs.

1808. JUŠTŠUK, E. **Swedish barkers.** *Transl. For. Prod. Lab., Can.* No. 54, 1953. pp. 11. 5 refs. Transl. by F. Bender from *Holz Roh- u. Werkstoff* 10 (6), 1952 (229–38). [Cf. *For. Abstr.* 14 (No. 675).] P.R. [Limited distribution.]

822. *Saws and Sawing*

See also Nos. 1391–2, 1765, 1861 *et seq.*, 1877, 2079.

1809. BABIĆ, S. Predlog za poboljšanje prerade trupaca na mašinama za obradu drveta testerama. **[Improvement of log conversion with the aid of sawing machines.]** *Šumarstvo* 6 (4), 1953 (309–19). [Serb.e.g.]

In order to avoid inaccurate sawing (particularly with frame-saws), mainly due to the fact that the saw itself and the feeding mechanism plus log form two independent units with different vibrations and oscillations, the author suggests and illustrates a solution embodying a feeding system mounted on the same foundation as the saw; instead of the usual two-roller systems, the new system has only the top rollers which press the log against a U-shaped precision sliding carriage having 2 end-pieces with log spikes. The carriage can also be fitted with a 'comparator' for checking the truly parallel mounting of blades in the frame.

1810. ORLICZ, T. Wydajność traków pionowych. **[Capacity of vertical frame-saws.]** *Prace rol.-leśn. polsk. Akad. Um.* No. 63, 1952. pp. 101 + 1 gph. 22 refs. [Pol.pol.e.russ.]

A detailed analysis of factors influencing the feed speed, which is, as a rule, limited by (1) too great a chip thickness, causing deformation of teeth and blades; (2) too large a volume of chips in the gullet; and (3) overloading of the saw. Results of tests to determine the effect of these factors on the feed speed for spring-set saws are summarized in the form of equations and nomograms. [Cf. *For. Abstr.* 13 (No. 1580).]

1811. ORLOV, M. N. Novyĭ sposob ustanovki i natjaženija ramnyh pil. **[New method of setting and straining frame-saws.]** *Lesn. Prom.* 12 (10; 11), 1952 (25–9; 24–8). [Russ.]

Presents some results of investigations on the straining of frame-saw blades, describes the new method of setting and straining and gives the results of its practical application. A special apparatus has been developed for measuring the stiffness of the blade, defined as the ratio of the lateral load on the blade to its deflection, and determined at the centre of its free length at a distance of 5 mm. from the tooth gullet base. Blades ca. 120 cm. long, ca. 12 cm. wide, and 2·05, 1·88, 1·45, and 0·95 mm. thick were tested. Results varied between 5 and 6 kg./mm. Formulae are developed for the effect of blade excentricity (degree of divergence of the line of straining from the blade axis) on the distribution of normal stresses in the strained blade, and also

for the effect on the stiffness of the blade of the straining force and of the way the normal stresses are distributed. This stiffness has a certain value for a given excentricity at the middle of the blade length, irrespective of the blade's being mounted with or without overhang. The part played by the intrinsic stiffness of the blade is stressed, and it is concluded that, for blades from 0·95 to ca. 2 mm. thick, the relative excentricity (excentricity/blade width) at the middle of blade length can vary from 0·2 to 0·4 instead of the constant theoretical value of 0·1 derived without taking intrinsic stiffness into account. A new method of setting and straining the complete sash of blades is described in detail and illustrated, and its merits are discussed; the main advantages are the possibility of using thinner blades and the reduction of waste when cutting boards below $\frac{3}{4}$ in. thick. The method can be used with or without a hydraulic straining appliance.

1812. Knežević, M. Grafički način određivanja rasporeda gaterskih testera (španunga). **[Graphic method of determining the spacing of frame-saw blades.]** *Glasn. šum. Fak. Beograd* No. 6, 1953 (3–16 + 1 gph). 2 refs. [Serb.serb.e.]

Stresses the necessity of using graphs for such determinations. [Cf. *For. Abstr.* 14 (No. 706).]

1813. Knežević, M. Uticaj širine reza i rasporeda gaterskih testera na procenat iskorišćenja. **[Effect of the kerf width and spacing of frame-saw blades on outturn.]** *Šumarstvo* 6 (4), 1953 (292–308). [Serb.e.g.]

[Cf. *For. Abstr.* 14 (No. 706).] Tabulates and graphs the saving of wood resulting from the reduction of kerf width by 1 mm. (from 3 to 2, or from 4 to 3 mm.) for edged and unedged boards, for flat sawing, squaring, and sawing with a blade spacing ensuring the maximum outturn. Savings vary from 2·1 to 3·4%. Even (sawn core) or uneven (boxed heart) blade arrangements give differen savings when the kerf width is reduced by 1 mm.: the former is more advantageous for boards 24 mm. thick, the latter for boards of 18 mm. For unedged boards, the saving from using the optimum blade spacing is ca. 4% compared with the usual flat sawing; for edged boards ca. 2·5%.

1814. Skoglund, C., and Hvamb, G. Tannvinklenes innvirkning på kraftforbruket ved saging med og mot fibrene. **[The effect of tooth shape on cutting forces in 'up' and 'down' sawing.]** *Medd. norsk trätekn. Inst.* No. 4, 1953. pp. 9 + 5 dgms. + 4 gphs. 4 refs. [Sw.e.] Also as *Medd. svenska TräforsknInst. (trätekn. Avd.)* No. 37*B*. P.R.

A pendulum dynamometer was used in studying circular sawing of *Pinus sylvestris*. The following results applied to both 'down' sawing (the normal method, in which the saw teeth cut down into the timber) and 'up' sawing (in which the teeth cut up, from below the bench): (1) hook angles of 20–30° gave the best performance, smaller hook angles increasing the cutting force (kg./tooth) required and larger hook angles weakening the teeth; (2) clearance angles of 10–15° proved sufficient to avoid unnecessary friction; there was an unexpected rise in cutting force for angles over 25°; and (3) the top bevel angle was of little value, causing only a slight reduction in cutting force while increasing the cost of grinding. 'Up' sawing required lower cutting forces than 'down' sawing, this tendency being more marked in dry than in wet wood.

1815. Saito, Y., and Mori, M. **[The buckling of thin band-saw blades.]** *Wood Ind., Tokyo* 8 (7; 8), 1953 (291, 309–12; 336, 355–61). 10 refs. [Jap.e.] P.R.

Presents formulae for buckling loads.

1816. Es. Zur Verwendung dünner Sägeblätter. **[The use of thin-gauge saw blades.]** *Holz-Zbl.* 79 (115), 1953 (1230). [G.]

Tabulates data (frame width, height of cut, blade dimensions, number, height and angles of teeth, setting of teeth) for blades chiefly of 1·2–1·6 mm. thickness, emanating from East Germany where the use of thin blades is said to be obligatory.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning*

1817. Vom Einfluss der Mittenspandicke beim Fräsen von Holz. **[The effect of middle chip thickness in processing wood with rotary cutters.]** *Holztechnik* 33 (8), 1953 (304–5). [G.] P.R.

Gives a formula for evaluating the chip thickness and a chart for quick evaluation of a formula factor involving the cutting depth and the diameter of the cutter.

1818. Kinoshita, N. **[A study of the new planing method using a portable planer with a solid profile cutter.]** *Wood Ind., Tokyo* 8 (6), 1953 (242, 257–60). P.R.

The new cutter [illustrated] was used attached to an electric planer. Surfaces of *Cryptomeria japonica* obtained by this cutter showed its superiority over the ordinary cutter for interlocked grain. Causes of surface roughness have been examined and classified. *From author's summary.*

1819. Mirish, P. **The cutting action of tenoning cutters.** *Wood* 18 (10; 11), 1953 (402–4; 438–9).

824. *Forms of Joint. Jointing and Assembly*

824.1. Nailed Joints

See also No. 1895.

1820. Stern, E. G. **Fundamental considerations in the design of nailed structures.** *Civil Engineering and Public Works Review, London* 47 (547–549), 1952 (62–3; 145–6; 230–3). 20 refs. L.S.

A documented collection of basic information on recommended practices in nailed structures, based mostly on national standard specifications of different countries.

824.2. Screwed Joints

1821. **Pre-boring for woodscrews. A survey of Swedish and American research.** *Information Report, Technical Information Service, Furniture Development Council, London* No. 4 [*n.d.*]. pp. 5. 2 refs. P.R.

824.3. Bolted Joints

See also No. 1895.

1822. Kojis, D. D., and Postweiler, R. H. **Allowable loads for common bolts at various angles to the grain for Southern Yellow Pine.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (21–6). 10 refs.

Recommendations, based on test results, for modifying existing formulae.

824.5. Timber Connectors

See also No. 1895.

1823. Brock, G. R. **The strength of toothed-plate timber connector joints.** Forest Products Research Laboratory, Princes Risborough, Bucks. 1952. pp. 43. Limited distribution. P.R.

Presents tabulated and graphed results of tests on 'Bulldog' and 'Bat' connector joints, and their performance.

1824. **Connector for timber.** *Brit. Stand.* No. 1579, 1953. pp. 19. Price 3*s.* 6*d.* P.R.

824.7. Glued Joints

1825. Richards, D. B., and Cool, B. M. **End joints for Southern Pine.** *Leafl. Ala. agric. Exp. Sta.* No. 39, 1953. pp. 4.

Describes, with illustrations, a new type of fingered glued joint, cut with a 2-winged solid cutter mounted on a spindle shaper, and giving strengths averaging 75–80% that of clear timber for untreated Longleaf Pine, and nearly 80% that of solid timber for wood treated with Cu naphthenate. The design of similar joints and the uses of end-jointed timber are discussed.

824.8. Glues and Gluing

See also Nos. 1795, 1878, 1881–2.

1826. **How to select a woodworking glue.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 256, 1953. pp. 2. P.R.

1827. Vorreiter, L. Die Tropenfestigkeit von Leimverbindungen. Motivenbericht zum Normblattentwurf. **[Resistance of glued joints in tropical conditions. A report for a suggested standard.]** *Holz-Zbl.* 76 (143), 1950 (1613 . . . 1616). [G.] P.R.

Test 'climates' for glued specimens should have the following characteristics: (1) tropical rain-belt climate: 40° C. and 96% relative humidity; (2) tropical dry belt (*a*) day: 60° and 10% r.h., (*b*) night: 10° and 15% r.h. The use of two values of joint strength is suggested: the 'hydro' strength for conditions in (1), and 'solar' strength for conditions in (2), the latter being determined in tests where a temperature of 60° (from visible, ultraviolet and infra-red radiation) alternates with 10° every 12 hours. Besides these 2 strengths, the author suggests determining 4 others, viz.: (3) 'solhydro', combining the dry and wet tropical conditions, (4) 'arid tropical' (including attack by termites), (5) 'hydro tropical' (including attack by moulds and termites), and (6) 'all tropical' (comprising 1–5). The use of Spruce instead of Pine as test material is recommended.

1828. Hinken, E. W. **A new method for observing gap-filling of wood adhesives.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (15–20). 9 refs. [University of Michigan.]

Describes with illustrations a method of testing gap-filling properties of an adhesive by controlling at predetermined levels: (1) the distance between the joined surfaces; (2) the rigidity of the joined members; and (3) (by applying air pressure to the adhesive independently of the clamping pressure applied to the members of the assembly) the pressure received by the adhesive. Results of experiments using this method to show the effect of curing time and pressure on the strength of a urea-formaldehyde adhesive for different glue-line thickness, and of glue-line thicknesses, on strength for 5 glues cured for 7 days are tabulated.

1829. Winter, H., and Kaliske, G. Untersuchungen an einem Kaseinkaltleim. **[Tests on a cold-setting casein glue.]** *Holz Roh- u. Werkstoff* 11 (8), 1953 (311–5). [G.g.] P.R.

Results of a systematic study with a glue consisting of 62–65% milk casein, 22–25% $Ca(OH)_2$ and 4–5% NaF.

1830. **'Aerolite' 300 for small boats. Some notes on the production and assembly of pre-fabricated kits.** *Bull. Aero-Res., Duxford* No. 122, 1953. pp. 4. P.R.

1831. Knight, R. A. G., Doman, L. S., and Soane, G. E. **Investigations into glues and gluing. The bonding of preservative-treated veneers with phenolic resin.** *Progr. Rep. For. Prod. Res., Lond.* No. 72, 1952. pp. 4 + 2 tbls. Limited distribution. P.R.

Presents results of a preliminary set of experiments, the findings being based on very limited data.

1832. Guiher, J. K. **The effect of alkyl-substituted phenolic adhesives on the bonding of Douglas Fir veneer.** *Abstr. of thesis* in *Dissert. Abstr.* 13 (4), 1953 (475–6). [Michigan State College.] O.R.S.

The following main conclusions were reached from results of a series of experiments: (1) The shear strength of plywood bonded with different resins decreased in the order – m-cresol-formaldehyde, phenol-formaldehyde, m-ethylphenol-formaldehyde, and 3,5-dimethylphenol-formaldehyde resins. (2) Plywood strength increased with the increase in sp. gr. of veneer. (3) Plywood strength increased with the addition of walnut-shell flour in amounts of 10–20% of the content of resin solids. (4) Maximum plywood strength was reached in 9–16 days after bonding.

1833. Watanabe, H., and Takakuwa, F. **[Gluing Shina [*Tilia* sp.] plywood with urea-resin adhesives.]** *Wood Ind., Tokyo* 8 (3), 1953 (97, 124–6). [Jap.e.] P.R.

(1) Hot-pressing immediately after removal from the cold press gave better results than when the plywood was allowed to dry at room temperature first. (2) No great variations in adhesive strength were found to result from changes in closed assembly time, pot life of the glue, and the time elapsing after the preparation of the glue. (3) Maximum adhesive strength for a pressure of 5 kg./sq. cm. was obtained

from a hot-press temperature of 100° C. and 5 min. pressure; and for 10 kg./sq. cm. from 120° and 5 min. *From authors' summary.*

1834. PLATH, E. Hitze- und Säurehärtung. **[Heat-hardening and acid-hardening [of synthetic resin glues].]** *Holz Roh- u. Werkstoff* 11 (10), 1953 (392–400). 10 refs. [G.g.] P.R.

Describes the preliminary tests and attempts to deduce from their results a physico-chemical explanation of the reaction mechanism of acid-hardening.

1835. GEFAHRT, J. Elektrische Widerstandsverleimung. **[Gluing with electrical resistance heating.]** *Holz* 6 (10–12), 1952 (246–9; 275–7; 294–5). 6 refs. [G.] P.R.

Discusses the efficiency of resistance heating, form and size of heating elements, the source of current, and possibilities of use.

1836. **Glued fork-head joints and radio-frequency heating for the production of railway crossing timbers.** *Bull. Aero-Res., Duxford* No. 121, 1953. pp. 4. Transl. from *Holz Roh- u. Werkstoff* 10 (8), 1952 (319–23). [Cf. *For. Abstr.* 14 (No. 2695).] P.R.

1837. WEINHOLD, S., and WEINHOLD, W. Heissverleimung von Holz mit Hochfrequenzwärme. Die Anwendung der Hochfrequenzheizung in der Holzindustrie und Vergleiche mit anderen Verfahren der Abbindezeitverkürzung. **[Hot gluing of wood by R.F. heat. The use of R.F. heating in the wood industry and comparison with other methods of expediting setting.]** *Holztechnik* 33 (11), 1953 (532–6). 10 refs. [G.] P.R.

A general account.

1838. BOOTH, F. L. **Small plants can edge glue with electronic equipment.** *Veneers & Plyw.* 47 (3), 1953 (26, 28–9). P.R.

Illustrated description of a one-man Roto-Gluer with a conveyorized glue spreader, and of a continuous edge-gluing machine.

1839. EDWARDS, N. C. **High-frequency heating applied to the manufacture of case ends.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 194, 1953 (1–2).

Describes briefly an experimental press designed for continuous edge-gluing of pairs of boards to produce panels $14\frac{1}{4} \times 8\frac{3}{4} \times \frac{5}{8}$ in. The best gluing rate was 6 joints/min., representing an energy dissipation of 450 watt sec./sq. in. of glueline. It is estimated from the results that equipment using dielectric heating and costing roughly £2000 will have the same output as a mechanical jointer costing about £12,000.

1840. TIGELAAR, J. H. **Bonding metals and plastic to wood.** *Wood-Worker, Indianap.* 72 (6), 1953 (14, 62, 64–5). P.R.

Discusses problems encountered in bonding metals or plastics to wood, in particular the preparation of the surface.

825. *Cleaving. Adzing. Mechanical Comminution*

See also No. 2079.

1841. OTTERSLAND, P. N. **Improvements in and relating to rotary wood cutting machines.** *Brit. Patent* No. 697,770, Sept. 30, 1953. pp. 2 + 1 dgm. P.R.

A chipper enabling chips to be produced with cleanly cut ends.

826. *Peeling. Slicing. Trimming, Edging etc. of Thin Sheets*

See Nos. 1876–9.

827. *Bending. Moulding (other than by Cutting)*

See Nos. 1760, 1884.

829.1. *Finishing*

See also No. 1795.

1842. ORTH, R. Procédé pour le blanchiment du bois. **[Method of bleaching wood.]** *French Patent* No. 1,019,417, Jan. 21, 1953. pp. 2. [F.] P.O.

Wood is first treated with solutions of hydroxides of alkali metals for the purpose of facilitating the effect of H_2O_2 to be applied later.

1843. KASEI, S., and ICHIHARA, A. **[Studies on grinding [sanding] wood. Part 1.]** *Wood Ind., Tokyo* 8 (1), 1953 (1, 27–30). [Jap.e.] P.R.

Tests were made with a sandpaper of uniform fineness on heartwood of *Magnolia hypoleuca.* The apparatus and the size of the test pieces are shown in diagrams. The relationship between load and sanding-travel at different speeds was determined and the sanding property of the abrasive was found to decrease in inverse proportion to the square root of the working time. Damage to the abrasive was examined microscopically and its relation to working time studied. The calculated and actual values of the wood dust were compared. [Results are given in graphs.] *From authors' summary.*

1844. LÜTHGENS, M. Neue Methoden der Oberflächenbehandlung von Holz. **[New methods of surface treatment of wood.]** *Holz* 6 (8), 1952 (193–6). [G.] P.R.

Illustrated description of modern spraying methods (cold spray, warm spray, spraying with the use of superheated steam, 'flame spraying', electrostatic spraying) and methods of completing the finishing process.

1845. DICKENSON, T. A. **Electrostatic finishing of wood products.** *Woodwkg. Ind.* 10 (9), 1953 (527–9). P.R.

Illustrated description of a new process of coating wood. The coating material is sprayed through a high-voltage electric field, and the electrically charged coating particles are attracted electromagnetically to the surface of wooden products earthed through the conveyors. The merits of the new process, including low running costs, are discussed.

1846. NIESEN, H. Oberflächenbehandlung von Maserfurnieren. **[Surface treatment of figured veneers.]** *Holz Roh- u. Werkstoff* 11 (8), 1953 (315–20). 5 refs. [G.g.] P.R.

Results of tests on the behaviour of glossy lacquers on figured veneers.

1847. GILLES, F. Peinture et vernissage du bois. **[Painting and varnishing of wood.]** *Étude tech. Cent. tech. Bois* No. 14, 1953. pp. 43. 10 refs. [F.] P.R.

Includes sections on: various factors affecting the durability of varnish and paint coatings; composition of the coating with reference to actual requirements; surface preparation; methods of application; defects and deterioration of external coatings, their causes and prevention; re-varnishing and re-painting.

1848. HOF, T. Eigenschappen van hout in verband met het aanbrengen van verflagen. **[Properties of wood in connexion with the application of paint.]** *Verfkroniek, Amsterdam* 25 (11), 1952 (297–9). [Du.du.e.] L.S.

Describes briefly the structure of hardwoods and softwoods and discusses the failure of paint coating in relation to wood structure. Failure often starts at the late-wood layer. Other causes of failure (differing paint penetrability, and different wood densities) are also discussed.

1849. KÜCH, W., and GRÖBER, H. Über die Verträglichkeit von Anstrichmitteln mit Holzschutzmitteln. **[Compatibility of paints with wood preservatives.]** *Holz Roh- u. Werkstoff* 11 (10), 1953 (382–5). 6 refs. [G.g.] P.R.

A general account and working procedure.

1850. JAYNE, B. A. **Finish checking of hardwood veneered panels as related to face veneer quality.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (7–14, 91). 4 refs. [Yale University School of Forestry, New Haven.]

The effect of a number of variables on checking of the finish on veneers of rotary-cut Yellow Birch, flat-sliced Black Walnut and flat-sliced White Oak exposed to high and low humidity cycles was studied. Checks in the finish were nearly always caused by knife checks in the surface of the veneer. These could be avoided or reduced by different combinations of assembly (i.e. exposure of the tight or loose face of the veneer) and depth of sanding. Knife check depth in sliced veneers was less in areas where checks ran across the direction of the wood rays. Use of a filler did not affect checking in the finish.

1851. SMITH, M. W. **Staining of hardwood floors.** *Pest Control* 21 (8), 1953 (41). D.S.I.R.

Prevention and removal of stains occurring during termite treatment on hardwood floors fastened with mastic to concrete slabs are discussed.

1852. MAPA, A. G. Procédé de vieillissement artificiel des bois secs. **[Method of artificial ageing of seasoned wood.]** *French Patent* No. 1,024,285, March 31, 1953. pp. 2. [F.] P.O.

Dry wood conditioned previously in air of 50–70% relative humidity is first subjected to vacuum and then treated with dry saturated water vapour under pressure (and at elevated temperature).

1853. NORDLANDER, K. J. H. Puun käsittely- ja kyllästämismenetelmä. Sätt att behandla och konservera trä. **[Method of treating and preserving wood.]** *Finnish Patent* No. 25,784, March 18, 1953. pp. 2. [Fi.Sw.] P.O.

Method of treating wood to give it a sub-fossil character by placing it in a vessel with an aqueous nutrient medium, suitable for decay bacteria; the amines from the ensuing decay processes enter the wood and form salts there with the decay products formed by the wood.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

1854. BEEKMAN, W. B., *et al.* Hout in alle tijden: bossen, bomen en toegepast hout in het verleden. **[Timber in all ages: forests, trees and the use of wood in the past.]** N. V. Uitgevers-Maatschappij Æ. E. Kluwer, Deventer. Vols. 1 and 2, 1949. pp. [10] + 715; pp. [4] + 776. Many refs. [Du.] Price £5. 10*s.* 0*d.* each volume.

Contains a number of contributions by different authors on forests, tree species and the uses of wood, Vol. 1 covering the period from prehistoric times to the ancient Persians and Vol. 2 from the ancient Greeks to the Byzantine age with various uses of wood up to the end of the nineteenth century, including special articles on boats and ships, musical instruments, inlay work, furniture and interior woodwork, and carving.

1855. ROMANOV, N. T. Ispoljzovanie malomernoĭ drevesiny v konstrukcijah. **[Utilization of small timber in constructions.]** *Lesn. Prom.* 12 (11), 1952 (22–4). [Russ.]

Tests have shown that stringers of fire ladders can be made by gluing together pieces of as little as 1 m. in length and 3 × 9 cm. section. The results are also presented of trials in making bowstring trusses and beams for oil derricks from glued small timber.

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 1411, 1757, 1855, 1892, 1918, 1925, 1933–5, 1938–9, 1941–9, 1994, 2025, 2079.

1856. WILSON, T. R. C., and DROW, J. T. **Fiber stresses for wood poles.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1619, 1953. pp. 10 + 3 gphs. P.R.

Presents data on U.S. pole production and needs, reviews the action of different standardizing committees and describes a systematic procedure for deriving design stresses for poles of any species.

1857. JONAS, G.-Z. Leitungsmaste aus Holz. Ihre Herstellung, Imprägnierung und Behandlung. **[Power transmission poles, their manufacture, preservation, and treatment.]** *Holz-Zbl.* 79 (104), 1953 (1113–4). 9 refs. [G.g.]

Discusses the problems of cutting to length, barking, sorting, storing, and different methods of impregnation, applicable to poles; with sections on the effect of wood properties on the impregnation process and the strength of the pole, on the treatment and storage of the poles before use, and on the average service life of power transmission poles, based on literature referred to in the article.

1858. **Wood poles for overhead lines (power and telecommunication lines).** *Brit. Stand.* No. 1990, 1953. pp. 14. 5 tbls. Price 2*s.* 6*d.* P.R.

1859. STERN, E. G. **New type of fence staple.** *Timber Technol.* 61 (2168), 1953 (269–71). P.R.

Discusses the merits of new L-shaped threaded-shank fence staples compared with the ordinary U-shaped staples.

832. *Mills, Their Functions and Products*

832.1. Sawmills and Planing Mills

See also Nos. 1688, 1765, 1809 *et seq.*

1860. WALMARI, Z. Sahateollisuuden palosuojelun kehityksestä Suomessa vuoden 1949 jälkeen. [**The development of precautions against fire in the Finnish sawmill industry after the year 1949.**] *Pap. ja Puu* 35 (9), 1953 (335–48). [Fi.e.] P.R.

A detailed account of legislation and precautions (appliances and trained fire-fighting staff, lay-out especially in timber yards, and communications).

1861. CERMAK, F. Au Pakistan oriental: modernisation d'une vieille scierie et réorganisation de la production des sciages. [**Modernization of an old sawmill and reorganization of the sawmill industry in Eastern Pakistan.**] *Bois For. Trop.* No. 29, 1953 (32–43). [F.e.span.]

1862. ALLOUARD, P., and HUGUET, L. La modernisation d'une scierie tropicale d'importance moyenne au Mexique. [**Modernization of a medium-sized tropical sawmill in Mexico.**] *Bois For. Trop.* No. 27, 1953 (16–22). [F.e.span.]

1863. **Log-handling operations simplified on economical basis with all-electric Motocylinder.** *Rev. int. Bois* 20 (184), 1953 (184–5). [E.F.]

A short account of a machine (produced by the Westinghouse Electric Corporation, San Francisco) which has replaced in some American sawmills their former steam plants that used to burn waste-wood, which is now converted into pulp etc.

1864. HERRICK, A. M. **Simplifying the determination of the zero-margin diameter.** *J. For.* 51 (11), 1953 (795–8). 4 refs.

Suggests that: (1) using log-run (number of logs/1000 bd. ft. of lumber) instead of log or tree diameters simplifies the prediction of milling costs and lumber-value yields, because by using this factor linear correlations are established; (2) log grade—relatively unimportant in controlling saw-time except as grade is reflected by log diameters—is important in calculating quality index ('mill run' value expressed as weighted % of price); (3) sawing time and quality index are readily convertible to sawing cost and lumber value respectively. [Supporting regression equations and graphs are given.] *From author's summary.*

1865. FORSBERG, P. Några provsågningsresultat. [**Some results from test sawings.**] *Medd. svenska TräforsknInst.* (*Trätekn. Avd.*). No. 33*B*, 1952. pp. 11 + 3 gphs. + 3 tbls. [Sw.] P.R.

Discusses the accuracy of volume estimates based on mid-diameter or top/butt diameter from formulae and top diameter from volume tables [cf. *For. Abstr.* 15 (No. 749)]. Gives tables and graphs based on answers to a questionnaire circulated to 22 mills showing: output of different dimensions from the mills; output as a % of intake; output by assortments (planks and boards, chips, sawdust and firewood); and in more detail, for one sawmill only, output of Spruce and Pine sawtimber from different log sizes.

1866. **Sawmill studies: the conversion of hardwood thinnings.** *Aust. Timb. J.* 19 (5), 1953 (363–4).

Milling studies were made on thinnings from 5 Eucalypt spp., Turpentine [*Syncarpia procera*] and Brush Box [*Tristania conferta*]. A total of 1376 logs with girths ranging from 18 to 53·9 in. (average 35·6 in.) was studied. Production rate was quite reasonable for a Queensland sawmill, though rather higher than for 230 normal hardwood logs milled for comparison. Recovery was 56·5% on net Hoppus measure as compared with 61·4% for the normal logs. Sapwood was the major factor causing degrade; the product in normal hardwoods was either specially select or 1st grade and in thinnings either 1st or 2nd grade. The effect of girth on grade for the individual species is to be studied.

1867. JOVANOVIĆ, J. Iskorištenje tanke tehničke oblovine. [**Utilization of small industrial roundwood.**] *Šum. List* 77 (4/5), 1953 (186–92). [Croat.]

Presents tables giving the ideal and the actually attainable breakdown of a log 18 cm. in diam.

1868. TIMOTIJEVIĆ, R. Prilog obradi problema vratila (šubija). [**The problem of small square timber.**] *Glasn. šum. Fak., Beograd* No. 6, 1953 (77–90). [Serb.serb.f.]

A geometrical analysis of the problem of breaking down cylindrical or tapering logs into small square timber of 87 or 116 mm. square section and 2·1–5·25 m. long.

1869. POPOVIĆ, V. Razmeravanje debla i racionalno iskorišćavanje drveta pri izradi nekih šumskih sortimenata. [**Measurement of the tree-length log, and rational utilization of wood in the manufacture of some timber assortments.**] *Glasn. šum. Fak., Beograd* No. 6, 1953 (17–42). [Serb. g.]

Discusses mathematically the following problems of rational wood utilization: (1) sawing into logs in the forest; (2) squaring; (3) manufacture of French staves and Beech-wood staves; and (4) manufacture of oars.

1870. MILOVANOVIĆ, A. O razmeravanju krive oblovine. [**Measuring curved roundwood.**] *Šumarstvo* 6 (5), 1953 (456–61). [Serb.serb.g.]

Derives formulae for evaluating the utilization % of curved logs and discusses the effect on it of length, diameter and curvature.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 1762, 1826 *et seq.*, 1850, 1898, 1900, 1905, 1956, 2022.

1871. LUTZ, J. **Cutting and drying properties of Redwood veneer.** *Veneers & Plyw.* 47 (8), 1953 (8–9, 30–1). P.R.

Presents some results of tests made at Madison, and information gained from industrial observation, relating to the selection and preparation of veneer

logs of *Sequoia sempervirens*, veneer cutting, drying, yield and gluability.

1872. TACK, C. H. **Plywood and veneer species.** *Tech. Note For. Dep. Uganda* No. 5, 1953 (1–2).

Of 43 tested, the following are reported suitable for (*a*) decorative veneers, peeled or sliced: *Cordia abyssinica, Entandrophragma angolense, E. cylindricum, E. excelsum, E. utile, Guarea cedrata, Khaya anthotheca, Ocotea usambarensis, Olea hochstetteri, Olea welwitschii*; (*b*) standard plywood: *Afzelia* spp., *Alstonia boonei, Antiaris toxicaria, Brachylaena hutchinsii, Celtis* spp., *Ekebergia rueppeliana, Funtumia latifolia, Hagenia abyssinica, Maesopsis eminii, Podocarpus gracilior, Trichilia emetica*; (*c*) box plywood or cores: *Acacia melanoxylon, Croton megalocarpus, Cupressus* spp., *Grevillea robusta* and *Podocarpus milanjianus.*

1873. **Trials of timbers for plywood manufacture. Progress report 19 (Superseding progress report 6). Consignments Nos. 659 and 768. Gaboon (*Aucoumea klaineana* Pierre). French Equatorial Africa.** Forest Products Research Laboratory, Princes Risborough. 1953. pp. 20. P.R.

1874. **Trials of timbers for plywood manufacture. Progress report 18. Consignment No. 760. Special tests. Black Poplar (*Populus nigra*) home grown.** Forests Products Research Laboratory, Princes Risborough. 1953. pp. 14. P.R.

Tests to determine the effect of the knife and pressure-bar positions on the woolly apperance of Poplar veneer.

1875. MCKINLEY, T. W. **Veneer tables: surface feet tabulations for rotary cut and special veneers.** *J. For.* 51 (11), 1953 (826–7).

Gives tables to show: (1) sq. ft. of $\frac{1}{10}$-in. veneer in 4-ft. lengths from logs of d.b.h. 10–40 in. by 1-in. steps; (2) sq. ft. of $\frac{1}{20}$-in. sliced veneer from logs of 10–48 in. d.b.h. by 2-in. steps.

1876. **New method of heating veneer logs electrically.** *Wood, Chicago* 58 (12), 1953. (36). P.R.

The method, developed at Madison, passes a current of 500–5000 volts and 24–12 amp. through the logs.

1877. SAKS, E. V. **Technique of flitch production.** *Veneers & Plyw.* 47 (10), 1953 (8–9, 18–23). P.R.

Discusses the grading specifications for sliced veneer flitches, and describes the technique of flitch sawing, with particular reference to quarter-sawn flitches.

1878. RÜB, F. Maschinen für das Zurichten von Furnieren. **[Machines for veneer processing.]** *Holztechnik* 33 (12), 1953 (578–81). [G.] P.R.

Illustrated description of spooling machines, clippers, edging machines, gluing machines, etc.

1879. HART, M. **Improvements in the production of wood veneers.** *Brit. Patent* No. 692,783, June 17, 1953. pp. 4 + 2 dgms. P.R.

A device for making cuts, bracketing imperfections either in the log as it rotates or in the veneer strip peeling from it, so as to reduce the number of manipulations necessary for removing the imperfections from the strip.

1880. FLEISCHER, H. O. **Veneer drying rates and factors affecting them.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (27–32, 91). 8 refs.

Describes tests to determine the effect of veneer thickness, and temperature, humidity and air velocity during drying on drying rates, and propounds a veneer-drying theory based on heat transfer. The report is to be published in more detail as *Bull. Yale Sch. For.* No. 59.

1881. SAKS, E. V. **Hot press technique has become precise operation.** *Veneers & Plyw.* 47 (6), 1953 (8, 30–4). P.R.

Discusses the following hot-press gluing faults: blisters, bleed, warping, starved joints, 'spotty' bond, weak bond, face checking, insufficient flow, overlaps and gaps, and press indentations.

1882. SAKS, E. V. **Veneer selection, wood species affect hot press.** *Veneers & Plyw.* 47 (7), 1953 (20–1, 24, 26). P.R.

Completing the survey of defects [cf. preceding abstract] it is stressed that straight-grained veneer is the best guarantee against warping. Some tropical woods contain substances (crystals, resin, NH_3) which are the cause of defects of appearance. The proper temperature and pressure are discussed and the hot-press technique and types of hot press are described.

1883. NEWALL, R. J. **Surface defects in veneering.** *Wood* 18 (12), 1953 (462–5). [Forest Products Research Laboratory, Princes Risborough.]

Discusses the causes of and methods for preventing, checking, cracking or furrowing of the face veneer of plywood or blockboard.

1884. MELLO, R. DE. **Improvements in or relating to the manufacture of corrugated plywood.** *Brit. Patent* No. 697,203, Sept. 16, 1953. pp. 3 + 3 dgms. P.R.

1885. SIIMES, F. E., and LIIRI, O. **Technical investigations on plywood. I.** *Transl. For. Prod. Lab., Can.* No. 56, 1953. pp. 30. 11 refs. Transl. from *Tied. Valt. tekn. Tutkimusl.* No. 95, 1951. [Cf. *For. Abstr.* 14 (No. 1585).] P.R.

1886. SCONCE, R. E. **Paper, Fir veneer 'wedded' to form containerboard.** *Veneers & Plyw.* 47 (5), 1953 (10, 32–4). P.R.

Discusses the merits of 'Ply-Veneer', a new product consisting of kraft containerboard (made from Douglas Fir chips) and a specially processed [Douglas] Fir veneer.

1887. PRASE, W. **A process for the production of insulating panels, door panels, furniture boards, or the like.** *Brit. Patent* No. 677,871, Aug. 20, 1952. pp. 3 + 3 dgms. P.O.

A panel consisting of two faces of suitable wooden material filled with a filling material divided into portions bounded by the jointing frame forming the outer edges of the panel and by transverse walls, the whole set being glued under pressure.

1888. PATERSON, J. V. **Improved method of constructing laminated structures.** *Brit. Patent* No. 681,039, Oct. 15, 1952. pp. 3 + 6 dgms. P.O.

Box-shaped (rectangular) sandwich structures of sheet metal, paper, fabric, a veneer, and a sheet of

wood; at least that part of the wood which is bent being of Balsa.

832.4. Wooden-House Factories. Prefabricated Houses and Standardized Parts of Houses

See also No. 1448.

1889. **Manual on wood construction for prefabricated houses.** Office of the Housing Expediter and Housing and Home Finance Agency, Washington. 1947. pp. 330. Price $1·50. P.R.

1890. SALLENAVE, P. Un type de maison tropicale en bois. [**A type of wooden house for the tropics.**] *Bois For. Trop.* No. 26, 1952 (393–402). [F.e.span.]

Description and specification, with plans and photographs, of a prefabricated wooden bungalow designed at Nogent-sur-Marne, with quantities needed and approximate costs.

1891. **Plywood houses for export.** *New Commonwealth* 26 (4), 1953 (190). O.G.

A short account (illustrated) of the Scottwood prefabricated house for export—(*a*) the Pacific type designed for semi-tropical conditions, and (*b*) the Baltic type for colder climates.

833. *Timber in Buildings and Engineering Structures* (*Manufacture and Use*)

See also Nos. 1855, 2117.

833.1. Building Components and Fittings: General

See also Nos. 1820, 1889–91, 2026.

1892. HART, G. **Timbers for house building. (Use Guide No. 1.)** Timber Development Association, London. [1953.] pp. 51.

Lists suitable softwoods and hardwoods (the latter divided into light, easily worked, and heavy and more difficult woods), for 33 categories of building components and fittings (including fences and gates), indicating the most suitable average moisture content, whether plywood can be used and if so the grade, whether the timber reacts with ferrous metals, its liability to brittle heart and restrictions on its use in the U.K. An appendix gives trade and vernacular names, botanical name, country of origin and weight.

1893. REECE, P. O. **The T.D.A. rigid frame.** *Wood* 18 (11), 1953 (416–20).

1894. SONNTAG, G. Dreieck-Streben-Bau. [**The triangular strut-lattice construction.**] *Holz-Zbl.* 77 (9), 1951 (87–8). [G.]

Illustrated description of a construction said to save ca. 50% wood material compared with other methods and to possess sufficient bending strength.

1895. STERN, E. G., and STONEBURNER, P. W. **Design of nailed trussed rafters.** *Timber Technol.* 61 (2164), 1953 (61–3). P.R.

Results of comparative performance tests on the following representative trussed rafters: nailed, Burrlock-assembled, bolted, and assembled with split-ring connectors. In general, the nailed ones have proved the most satisfactory.

1896. BROWNE, F. L. **Wood siding left to weather naturally.** *Extr.* from *Architectural Record, New York* Nov., 1952 (197–9). P.R.

Wood exposed to the weather gradually turns grey and wastes away roughly ¼ in. a century. Rust-resistant nails should be used if the wood is to remain unpainted; use of rough-sawn lumber and a grey oil stain are recommended to avoid patchy appearance during the first months or years.

1897. SONNEMANS, P. Rapport de recherches sur les châssis de fenêtre en bois. [**Report of investigations on wooden window frames.**] Centre Technique et Scientifique de l'Industrie Transformatrice du Bois et des Matières Connexes, Belgium. 1951. pp. 4 + 42 + 18 + 18 + 6 dgms., 15 gphs. [F.] P.R.

Gives the results of tests of over a dozen window frames of different design for air tightness, strains at the nosings, torsion and fatigue due to varying torsion, and strength of glued corners, and establishes satisfactory criteria.

1898. KRAEMER, O. Sperrholzplatten als Flächenheizkörper. [**Plywood panels as flat heating elements.**] *Archiv für die gesamte Wärmetechnik, Dissen* 2 (5), 1951 (97–101). 1 ref. [G.] L.S.

An illustrated description of panel-heating elements with a rating of 500–600 watts/sq. m., manufactured in Germany from bare resistance wire embedded between layers of plywood. They can be used for panelling the lower parts of the walls in dwellings; in the form of upright transportable heaters; as screens, footwarmers, heating elements for drying ovens, etc.

1899. ARMSTRONG, F. H. **Flooring tests. Qualities of timbers used in floors.** *Timber and Plywood Annual, London, 1951/52* 1952 (76, 78, 80, 82, 84). P.R.

Summarizes the results of tests on a number of woods differing in species, density, and conversion; the tests are being conducted at Princes Risborough, using a specially developed machine. Various types of surface breakdown are explained. Density is not the only factor governing the suitability of hardwoods for flooring; the part played by pores is stressed. The density of early and soft wood in conifers is responsible for their performance as flooring material. On the whole, qualitative classification is considered more important than quantitative tests for determining the suitability of a wood.

1900. A/S JUNCKERS SAVVÆRK. **Improvements in the manufacture of floor boards.** *Brit. Patent* No. 681,454, Oct. 22, 1952. pp. 2 + 11 dgms. P.O.

Two boards of equal size, one of good and the other of poor quality are each cleft longitudinally into two thinner boards. A laminated board is then constructed, with faces consisting of the thin boards (one good and one poor) and a core of veneer, or low-grade wood set with their grain at an angle to that of the boards.

833.7. Wood in Roads and Pavements

1901. LIESE, J. Erfahrung mit Holzpflasterstrassen. [**Experience with wood paving bricks.**] *Holz* 5 (3; 5), 1951 (62–4; 112–5). [G.] P.R.

Presents results of observations on public and experimental roads in Denmark and Germany, and discusses the merits of wood paving blocks and the possibility of their use.

834. *Shingles. Cooperage. Packing Containers. (Manufacture and Use)*

See also Nos. 1839, 2065.

1902. Šeĭnin, Ja. G. Tarnye cehi lesozagotoviteljnyh predprijatiĭ. **[Box-shook and stave sections in logging enterprises.]** *Lesn. Prom.* 12 (12), 1952 (10–4). [Russ.]

Describes the work in sections of the Kostromales 'Trust', producing staves, box-shooks and bobbin blanks from Aspen, Spruce and Birch.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.*

See also Nos. 1725, 1854.

1903. **The timber industry in the U.S.A. III. Woodware.** Organisation for European Economic Co-operation, Paris. 1953. pp. 42. Price [3*s.* 6*d.*]

Reports by Technical Assistance Mission No. 59B on a tour of plants making turned goods and miscellaneous items including skis, scythe handles, containers of different types, tooth picks, rifle butts and compressed-waste goods, and of some sawmills. The matter is arranged under the headings: raw material (species, wood quality, felling, buying); equipment (seasoning plant, sawing and other machinery, special and auxiliary machines, handling equipment, tools, machine shops); techniques (bobbins, dowels and cylindrical blanks, short handles and small turned parts, heavy turning, marking and packing); economic and social aspects; and conclusions and recommendations.

836. *Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments*

See also No. 1854.

1904. **The timber industries in the U.S.A. I. Timber and the furniture industry.** Organisation for European Economic Co-operation, Paris. 1953. pp. 129 + 1 dgm. Price [8*s.*].

Reports on a tour by Technical Assistance Mission No. 59A of the furniture industry in the Eastern and Central U.S.A. under the sections: the American approach; general; wood used in furniture making; the American furniture plant; methods of manufacture, labour; marketing; research and testing; trade associations; and training of higher staff, and makes some comparisons with conditions in Europe.

838. *Vehicles (including Ships, Boats, Aircraft)*

See also Nos. 1758, 1830, 1854, 1976.

1905. Brown, T. A. **'Laminar flow' aerofoils.** *Wood* 18 (12), 1953 (466–7).

Describes a new type of wing covered with thick Gaboon plywood for use in gliders, giving smoothness and rigidity within the desired limits.

839.2. *Wood Flour and its Manufacture*

1906. Reynolds, L. **Use and manufacture of wood flour.** *For. Rec. For. Comm., Lond.* No. 21, 1953. pp. 5. Price 6*d.*

839.8. *Industrial Waste Wood, its Processing and Uses*

See also Nos. 2047, 2052, 2055, 2068, 2072–3.

1907. Jones, I. **Uses for woodwaste.** *Report, Technical Information Service, Furniture Development Council, London* No. 7, 1953. pp. 25 + 17 + 15. 69 refs.

The report is in 3 parts covering (1) woodwaste as fuel (raw wood, gas production and briquettes); (2) physical uses (boards and mouldings from wood particles and synthetic binders, wood flour, soil improvement, building materials, miscellaneous uses); and (3) chemical uses (carbonization, extractives, plastics, other uses, and large-scale processes). Each part has lists of references.

1908. Fobes, E. W. **Wood-residue collection techniques.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (39–40, 92). 5 refs.

Discusses sorting, packing, transport by road or rail, and storage of coarse residues (e.g. slabs, edgings, logging slash) and fine residues (e.g. sawdust, shavings, chips).

1909. Gibbons, A. B. **Wood waste briquetting plant.** *Timber Technol.* 61 (2167), 1953 (232–4). P.R.

A general account of the technology of briquetting, with special reference to Presto-log, Cellopac, Papac, and Glomera briquettes.

1910. Yano, T. **Gas-generating carbonized product.** *Japanese Patent* No. 3735, 1951. [Jap.] From *Chem. Abstr.* 47 (4), 1953 (1918). P.R.

Carbonized sawdust (30 kg.) is mixed with 5 kg. 10° Baumé waste sulphite-pulp liquor containing 1% S, passed through a 10 (mesh sieve; 10 kg. of the mixture is sprayed with 4 litres of Pine oil, and let stand for 1–2 days, and 0·6 kg. of this preparation is mixed with the rest of the carbonized mixture and moulded in a press at a pressure of 100 kg./sq. cm.

1911. Vanslyke, A. L. **Report on Jotul stove performance test.** *Pulp Paper Mag. Can.* 54 (9; 10), 1953 (132 . . 151; 154 . . 174).

Describes the construction and performance in Canadian tests of this Norwegian stove and concludes that it is superior to the standard box stove in heat produced per unit of firewood, in uniformity of heat, and in the small amount of attention needed.

1912. Kruydenberg, J. W., and Wils, J. **Improvements in or relating to apparatus for burning waste from flax-working or wood-working machines.** *Brit. Patent* No. 689,421, March 25, 1953. pp. 2 + 2 dgms. P.R.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

1913. HUNT, G. M., and GARRATT, G. A. **Wood preservation.** McGraw Hill Book Company, Inc., New York. 2nd ed., 1953. pp. xi + 417. Many refs. Price $7·50 (£3. 0*s.* 0*d.*).

Contains chapters on the field of wood preservation; agencies of wood deterioration; wood preservatives; preparation of material for treatment; wood-preserving processes; factors affecting penetration and absorption; economic aspects of preservative treatment; properties of treated wood; treating plants and equipment; methods of protecting wood other than by standard preservative treatment; and fire-retarding treatment. Some of the main subjects not dealt with in the 1938 edition or dealt with very much more fully in the new edition are: the soil-block method of testing preservatives; oil solutions of toxic chemicals such as pentachlorophenol, other chlorinated phenols, Cu naphthenate and phenyl mercury oleate; water-repellent preservatives; some new proprietary preservatives; seasoning by the vapour-drying method; and new equipment such as lift trucks. The bibliographies at the end of each chapter have been extended and statistics on amounts of timber treated annually, costs etc. have been brought up to date.

1914. **Timber thrift: care and preservation of timber in storage.** *Stores Preservation Pamphlet, Inter-services Stores Preservation Organisation, Kampur* No. 7, 1952. pp. 51 + 15 photos + 13 dgms. + 1 map. 7 refs.

Includes recommendations for stacking, data on Indian timber pests (insects, fungi, marine borers, rats and mice), a selection on preservative treatments, a table showing processes and preservatives for timbers for different uses, and classification of Indian timbers by their seasoning qualities, natural durability and treatability.

841. *Wood Preservation*

See also Nos. 1831, 1849, 1857, 1913–4, 1964–8, 1973–7, 1998, 2117.

1915. **List of publications on wood preservation.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*704, 1952. pp. 29. P.R.

Includes publications (since ca. 1920) giving general information and Madison findings on preservative materials, methods of application, durability and service records of treated and untreated wood.

1916. KOLJO, B. Die Abhängigkeit der Tränkmittelaufnahme des Holzes von verschiedenen Faktoren unter besonderer Berücksichtigung von Kiefer und Fichte. **[The role of different factors in the absorption of impregnants by wood, with special reference to Pine and Spruce.]** *Holz Roh- u. Werkstoff* 11 (8), 1953 (303–11). 14 refs. [G.g.] P.R.

Presents results of an investigation made on 50 × 50 × 100-mm. samples of Birch, Oak, Spruce, and Pine (sapwood and heartwood), of ca. 12% moisture content (m.c.), the impregnants being 1% solution of $CuSO_4$ and commercial tar oil. Impregnation was conducted in an open tank and in a closed chamber without preliminary vacuum, at pressures ranging from 1 to 10 atm.; the times of treatment were 10, 30, and 90 min. The effect of m.c. up to about fibre-saturation point is a slight reduction of the pore volume; beyond the fibre-saturation point, however, the inner wood space that can be impregnated is strongly reduced. Air in wood hinders the absorption of impregnants. Results of pressure impregnation tests are tabulated and graphed.

1917. SCHICK, F. Holztränkungsöl. **[Oil for wood impregnation.]** *German Patent* No. 767,111, May 26, 1952. pp. 2. [G.] P.O.

A fraction of the low-temperature carbonization coal-tar oil, boiling between 200° and 400° C., is recommended as an impregnating agent not interfering with paint.

1918. BAYLOT, J. Procédé de conservation des bois. **[Method of wood preservation.]** *French Patent* No. 978,941, April 19, 1951. pp. 2. [F.] P.O.

Wood, in particular telegraph poles, is impregnated with the pyroligneous liquid obtained from wood distillation (particularly slabs or stumps of *Pinus pinaster*), with the addition of wetting agents (e.g. up to 0·4% of sulphonated terpenic alcohols).

1919. HEISEL, P., and MÜLLER, E. **Method of preserving wood.** *Brit. Patent* No. 680,934, Oct. 15, 1952. pp. 2. P.O.

Impregnation (methods: Rüping, osmotic, application of paste, spraying) with a chlorinated saturated aliphatic hydrocarbon which is in the form of an oil at room temperature and contains 10–20 C atoms and has a Cl content of 30–60%.

1920. HEISEL, P., and MÜLLER, E. Holzschutzmittel für nasse Hölzer. **[Wood preservative for wet wood.]** *Swiss Patent* No. 279,699, March 17, 1952. pp. 2. [G.] P.O.

A preservative in the form of a paste, containing water-soluble fungicide agents, oils and water-soluble inorganic salts that do not reduce the water-solubility and fungicidal properties of the preservative, the amount of the inorganic salts being up to 100% of the weight of the fungicide.

1921. SIMON, A., and BAUMGÄRTEL, E. Die grenzflächenaktiven Eigenschaften des Natriumpentachlorphenolats und sein Einfluss auf den Gütezustand wasserhaltiger Salz-Öl-Pasten. **[The surface-activity properties of Na pentachlorophenate and its effect on the quality of water-containing salt/oil pastes.]** *Holz Roh- u. Werkstoff* 11 (10), 1953 (377–82). 8 refs. [G.g.] P.R.

Tests showed that with water/tar-oil systems, Na pentachlorophenate is a moderately good emulsifying agent, preventing demulsification only when the concentration of the emulsion is not too high. While assisting the preparation of salt/oil pastes and their dilution with water, it does not sufficiently increase their stability. Very acid oils, and NaF, strongly reduce the stabilizing effect of Na pentachlorophenate.

1922. DAIMLER, K., and LORENZ, V. Verfahren zum Imprägnieren von Holz. **[Method of impregnating wood.]** *German Patent* No. 834,009, March 13, 1952. pp. 2. [G.] P.O.

Wood or the like is impregnated with water-soluble alkali salts of phenolic compounds containing not less than 10 C atoms in the molecule, and soluble rosin soaps with alkaline reaction are added.

1923. BAVENDAMM, W., and BELLMANN, H. Holzschutzmittel. UA-Salze. **[Wood preservatives. UA salts.]** *Holz Roh- u. Werkstoff* 11 (10), 1953 (413–6). 31 refs. [G.] P.R.

1924. ETTEL, V. **Process of impregnating wood with soluble arsenical compounds.** *U.S. Patent* No. 2,590,162, March 25, 1952. pp. 6. 6 refs. P.O.

Wood is treated with an aqueous 1–3% solution of a thioarsenite of Ca, Sr, Ba, or Mg, and then dried in the air.

1925. CURZON, G. E., and EISNER, H. S. **An assessment of the hazard caused by arsenious fumes from impregnated timber in underground fires.** *Research Report, Safety in Mines Research Establishment, Ministry of Fuel and Power, Sheffield* No. 78, 1953. pp. 15. 7 refs.

As a result of laboratory and large-scale tests, it is concluded that, with certain qualifications, the hazard is negligible compared with that from the CO simultaneously and inevitably produced.

1926. FINDLAY, W. P. K. **The toxicity of borax to wood-rotting fungi.** *Timber Technol.* 61 (2168), 1953 (275–6). 1 ref. P.R.

Tabulates the results of some tests made in 1939–40 at Princes Risborough. Borax is definitely toxic to wood-destroying fungi and merits further investigation. A solution containing not less than 3% of (hydrated) borax is recommended.

1927. MCMULLEN, M. J. **The detection of boron in treated timber.** *Analyst, London* 78 (928), 1953 (442–3). 3 refs. D.S.I.R.

1928. **Recent work on plant control methods of determining boron in timber and borax in treatment solutions.** *Aust. Timb. J.* 19 (5), 1953 (387 . . . 390).

Describes methods of determining amounts of boron in timber with curcumin (turmeric) [cf. *For. Abstr.* 14 (No. 1634)] and of borax in the preservative solution by crystallization or titration.

1929. ADKINS, B. L. **A method of estimating the weight of borax or boric acid in treatment solutions.** *Aust. Timb. J.* 19 (8), 1953 (609 . . . 613). 2 refs.

Presents and gives examples of the use of a nomogram for calculating the weight of borax or boric acid in the solution from the solution concentration and the solution volume.

1930. **The determination of sodium fluoride in treated timber and in treatment solutions.** *Aust. Timb. J.* 19 (4), 1953 (305, 307). 3 refs.

Describes colorimetric methods of determination.

1931. SCHUCH, K. Über die Bestimmung des Fluors im Holz. **[Determination of fluorine in wood.]** *Holz Roh- u. Werkstoff* 11 (2), 1953 (64–6). 4 refs. [G.g.] P.R.

Presents results of tests on the depth of penetration of F-containing preservatives, based on the method of Willard and Winter. It has been found that, while only ca. 1–2% of NaF remained in wood after leaching, the NaF retention was ca. 15% for mixtures of NaF + K_2CrO_4, and ca. 25% for NaF + $Na_2Cr_2O_7$ with or without an addition of Na hexametaphosphate.

1932. SCHULZE, B., and MÜLLER, R. Über das Verhalten von freiem Fluorwasserstoff im Holz. **[Behaviour of free HF in wood.]** *Angew. Chemie* 65 (13), 1953 (344–6). 14 refs. [G.] D.S.I.R.

Describes 3 methods for the quantitative determination of the uptake and release of gaseous HF by wood. Becker's results [cf. *For. Abstr.* 12 (No. 3200)] relating to the transfer of gaseous HF from a fluoride-treated to an untreated piece of wood over a distance up to several cm. in a closed vessel have been confirmed. HF penetrates into wood very rapidly and in relatively large quantities, depending on the actual partial pressure. Wood seems to have an ability for storing HF, probably by adsorption and by solution in its contained moisture.

1933. WALTERS, C. S. **Used crankcase oil not recommended for preservative diluent.** *For. Note Ill. agric. Exp. Sta.* No. 42, 1953. pp. 1.

It has been discovered that hyperkeratosis of cattle is caused by chlorinated naphthalenes. These compounds may be present in crankcase oil, which is sometimes used as a diluent for pentachlorophenol, Cu naphthenate, Zn naphthenate etc. for the preservative treatment of fence posts. In view of the dangers involved, crankcase oil should not be used for this purpose, particularly when the treated wood is to be installed on the farm.

1934. **[Preserving Pine sleepers by the steaming and vacuum process.]** *Wood Ind., Tokyo* 8 (4), 1953 (146, 163–5). [Jap.jap.e.] P.R.

Sleepers of Japanese Red Pine [*Pinus densiflora*], 14 × 20 × 210 cm. and averaging 75% moisture content, were treated by the Rueping process with coal-tar creosote. Satisfactory penetration was obtained with the following schedule: preliminary steaming for 6 hr. at 2 kg./sq. cm.; vacuum treatment for 2 hr.; preliminary air pressure of 2 kg./sq. cm. for not less than 30 min. to apply the preservative. *From author's summary.*

1935. **[Creosoting temperature suitable for Pine sleepers.]** *Wood Ind., Tokyo* 8 (6), 1953 (242, 261–2). [Jap.e.] P.R.

In experiments made by the Sanyo Wood Preserving Co., 10 sleepers of *Pinus densiflora* were used in each group of tests and were treated by the empty-cell process. Penetrations obtained were respectively 98%, 100%, 99% and 100% of the sapwood for treating temperatures of 40, 50, 60 and 70° C., and the corresponding retentions were 96, 100, 109 and 100 kg./cu.m. The viscosity of the creosote was examined. Japanese specifications call for a treating temperature of 60° C. but as a result of these experiments it is suggested that treating temperature should be related to the nature of the creosote used. *From author's summary.*

1936. LEDOUX, C.-P. Procédé d'imprégnation mixte des bois. **[Method of multiple impregnation**

of wood.] *French Patent* No. 974,818, Feb. 26, 1951. pp. 2. [F.] P.O.

A deep impregnation with creosote is followed by a surface impregnation with a bituminous product.

1937. DÖLGER, F. W. Verfahren zur Tiefimprägnierung starker Hölzer. [**Method of deep impregnation of large timbers.**] *German Patent* No. 856,053, Sept. 18, 1952. pp. 2. [G.] P.O.

Wood preservatives in high concentration are introduced into wood (e.g. by injection), and [other] preservatives are applied from outside by impregnation, painting or the like.

1938. DARWIN, W. N. **A mobile open-tank plant for treating posts and timbers.** Division of Forestry Relations, Tennessee Valley Authority, Norris, Tenn. 1950. pp. 6 + 2 pp. dgms.

1939. CONWAY, E. M., and SCHNELL, R. L. **Design and operation of open-tank timber treating plants.** Division of Forestry Relations, Tennessee Valley Authority, Norris, Tenn. 1953. pp. 26.

1940. MILOVANOVIĆ, A. Pokušaj impregnacije drveta u dubećem stanju. (Prethodno saopštenje). [**An attempt at impregnating standing trees. (Preliminary report).**] *Glasn. šum. Fak., Beograd* No. 6, 1953 (67–73). 6 refs. [Serb.serb.e.]

Tabulates and illustrates the results of experimental impregnation of 2 standing Oaks and 2 Beeches. Early in July 1952, $CuSO_4$ solutions (3–10%) and $ZnCl_2$ solutions (3–10%) were injected into deep 18–20 mm. holes bored into the butts. When the trees were felled late in the same month it was found that the chemicals had penetrated, though quite irregularly, to a height of 5–7 m.

1941. CARLO, L. Les procédés utilisés jusqu'à ce jour pour l'imprégnation des poteaux en bois et les expériences faites avec ces procédés. [**Methods so far used for the impregnation of wooden poles and the experience thereby gained.**] *Bulletin de l'Association Suisse des Électriciens, Zürich* 44 (2), 1953 (43–8). 9 refs. [F.] L.S.

Describes different methods of preserving green and seasoned wood, currently used in Switzerland and elsewhere.

1942. CARLO, L. Expériences faites avec les poteaux en bois imprégnés sur le réseau du Service de l'électricité de Genève. [**Experience gained with impregnated wooden poles in the area of the Geneva electrical grid.**] *Bulletin de l'Association Suisse des Électriciens, Zürich* 44 (2), 1953 (48–53). [F.] L.S.

Analysis of replacement records showed that the Boucherie method is not suitable for this area: the average life of poles was 18·7 years, compared with 21·5–23·5 years for the whole of Switzerland. Different methods tried to extend the life of poles in the Geneva grid area are described: Siemens dressings; coating of the butt end with antiseptics and disinfection of the soil (Wolman salts and carbolineum); re-impregnation of poles by the German 'Cobra' method; creosoting the butt end, and double impregnation ('Doppelstockschutz') which consists in repeating the ordinary Boucherie treatment ($CuSO_4$) with Wolman salts. This double impregnation has given the best results.

1943. SUOLAHTI, O. Kuorinnan ja varastointiajan vaikutus pylväiden kyllästyvyyteen. [**The effect of barking and length of storage time on the impregnation of poles.**] *Pap. ja Puu* 35 (8), 1953 (309–13). [Fi.e.] [State Institute for Technical Research, Helsinki.] P.R.

Experiments were made on preserving partly or completely barked Pine poles, after storage for different periods, using the normal pressure process with Boliden salt. Tabulated results [with English legends] are given showing the amounts of As_2O_5 in the outer, middle and inner parts of the sapwood. Poles felled in the preceding year were more easily preserved than those felled in the same year, which did not give satisfactory results before the autumn. Poles to be preserved in the year of felling should be completely barked immediately before preservation; partly barked poles are very refractory. Poles felled in the year before preservation will take the preservative satisfactorily even when only partly barked. *From author's summary.*

1944. MEYER, F. J., and GOOCH, R. M. **Pentachlorophenol grease for preserving poles.** *Electric Light and Power, Chicago* 30 (8), 1952 (108–11). L.S.

Describes a series of experiments carried out to determine the efficacy of pentachlorophenol grease (a solution in oil suspended in a gelling agent) applied to Western Red Cedar, Southern Yellow Pine, and Douglas Fir poles. Douglas Fir heartwood was not penetrated by the grease but sapwood was to a depth of $\frac{1}{2}$–$\frac{3}{4}$ in. Good end-grain penetration resulted when the grease was applied to Douglas Fir. The grease acts as a reservoir of the preservative which moves in as moisture conditions in wood become favourable. It was found that poles are well preserved at the ground line if the content of pentachlorophenol in the sapwood is ca. 0·4 lb./cu. ft., the preservative being concentrated in the outer $\frac{1}{2}$ in. or so. A $\frac{1}{8}$- to $\frac{1}{4}$-in. layer of grease with 5% pentachlorophenol has been found to give good protection.

1945. KRZYZEWSKI, J. **The hot-and-cold bath preservative treatment of Jack Pine and Spruce crossarms with pentachlorophenol solution.** *Mimeo. For. Prod. Lab., Can.* No. *O*-166, 1952. pp. 5 + 4 photos. P.R.

Results of tests on cross-arms of Jack Pine and White Spruce heated for different periods in a solution of pentachlorophenol in suitable medium-weight petroleum oil to ca. 220° F. and then allowed to cool, have shown that the net retention of the preservative does not improve markedly with prolonged periods of immersion in the cooling bath. For Jack Pine cross-arms, an average net retention of 7 lb./cu. ft. of 5% pentachlorophenol/petroleum solution would appear to give good service; with Spruce, the penetration and absorption obtained are inadequate.

1946. WALTERS, C. S., and MEEK, W. L. **'Season' penta-treated posts.** *For. Note Ill. agric. Exp. Sta.* No. 41, 1953. pp. 1.

If fence posts treated by cold-soaking in pentachlorophenol and fuel oil are set up immediately, the preservative tends to exude at the base of the post. It is recommended that, where practicable,

home-treated posts should be stacked horizontally for at least two weeks in warm weather, to permit much of the oil carrier to evaporate, leaving the pentachlorophenol in the wood.

1947. BEESLEY, J. **Sub-project P. 4–2: Treatment of fence posts in Victoria. Progress report No. 5. Test of treated fence posts on the Benalla-Mansfield Road, Victoria. Results of sixth inspection.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 13 + 12 photos, 2 tbls. P.R.

Describes the method of inspection and discusses the results obtained. The test was established in 1935; the treated posts can be expected to last for twice as long as the controls. $ZnCl_2 + As_2O_3$ gave better protection to split *Eucalyptus stuartiana* posts than creosote + mineral oil. But the latter protected round posts of both *E. stuartiana* and *E. macrorrhyncha* better.

1948. COLLEY, R. H. **The evaluation of wood preservatives. Part I. Interpretation and correlation of the results of laboratory soil-block tests and outdoor test plot experience, with special reference to oil-type materials. Part II.** *Repr.* from *Bell System Technical Journal, New York* 32 (1; 2), 1953 (120–69; 425–505). 129 refs. P.R.

Laboratory and field experiments for the purpose of determining the protective threshold quantities of wood preservatives are reviewed and interpreted, with special reference to the method followed in the soil-block tests at the Bell Telephone Laboratories. Includes discussion on the merits of the techniques involved. A correlation of results obtained from the soil-block culture tests, outdoor exposure tests on stakes and on pole-diameter posts is presented for the first time. It is shown that the same threshold values are obtained from all 3 types of accelerated experimental tests.

1949. **Durability of railway sleepers under service tests.** *Malay. Forester* 16 (4), 1953 (226–8).

Gives details of species, treatment, preservative, absorption, and service life of sleepers cut from 14 species. *Hopea sulcata* gave best results (average life 24 years), followed by 3 species of *Dipterocarpus* (*D. crinitus*, *D. verrucosus* and *D. lowii*).

1950. WALTERS, C. S. **Service-life calendar for forest products.** *For. Note Ill. agric. Exp. Sta.* No. 39, 1953. pp. 2.

Gives a table from which it is possible quickly to obtain the service age of a specimen in trials of preservative-treated wood, given the date of installation and the date of inspection.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

1951. UPSON, J. J. **Wood's dimensional stability promoted by new process.** *Wood, Chicago* 58 (8), 1953 (36, 38). P.R.

Discusses the effect of glycol dicarboxylic acid mono-esters (formed in the preparation of alkyd resins) when added to any cellulose fibre material (a newly patented process of imparting dimensional stability to wood and wood products).

1952. SEBORG, R. M., TARKOW, H., and STAMM, A. J. **Effect of heat upon the dimensional stabilization of wood.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (59–67). 14 refs. [U.S. Forest Products Laboratory, Madison.]

Tests on the effect of different swelling agents on heat-stabilized and unheated wood and on the effective stabilization of swollen wood and of non-swollen controls, suggest that the dimensional stabilization obtained as a result of high-temperature treatment is not caused by an ether cross-linking reaction. Tests on heating both paper and wood in the presence and absence of air indicated that air is not needed for stabilization. Up to a weight loss for wood of about 20%, the reduced hygroscopicity and dimensional changes are dependent upon weight loss and not upon the medium in which the wood is heated. Anti-shrink efficiencies above ca. 45% cannot be obtained by heating either in air or in N. Wood heated in N, unlike that heated in O, maintains this efficiency on prolonged heating. Higher anti-shrink efficiency is obtained by heating in a closed system. At high temperature the same minimum relative weight, radical dimensions, hygroscopicity and swelling values are attained in either the presence or the absence of moisture (oven-dry to 165% m.c.). At lower temperatures (160–205° C.) the presence of moisture in wood when it is heated causes a lower anti-shrink efficiency than in dry wood; the reason for this is not known. The % loss of volume on heating is unusually large and is due in part to a reduction in volume of the cell cavities. The loss of toughness, abrasion resistance and probably of shear resistance does not appear to be caused by oxidation, but is closely associated with other chemical factors causing stabilization and seriously limits the use of heat-stabilized wood.

1953. ANTONUCCI, G. Impregnazione del legno con metilolurea e dimetilolurea incondensate. **[Impregnation of wood with non-condensed methylolurea and dimethylolurea.]** *Industria della Vernice, Milano* 6 (10), [1953] (217–8). [It.] I.C.I.

Describes simple methods of preparing methylolurea, dimethylolurea, and the urea impregnating medium. The process of impregnation and subsequent curing (polymerization) is described in some detail.

1954. VLUGT, A. J. T. VAN DER. Verfahren zur Konservierung von Holz. **[Method of wood preservation.]** *German Patent* No. 763,974, July 10, 1952. pp. 4. [G.] P.O.

Impregnation (vacuum and pressure) with dilute aqueous, alkaline solutions of a phenolaldehyde resin, miscible with water in all proportions and containing saponified or non-saponified fats, oils or waxes, is followed by drying and heat-curing.

1955. ANCIAUX, F. **An improved composition for the preservation of timber and the like and for the waterproofing of walls.** *Brit. Patent* No. 670,258, April 16, 1952. pp. 2. P.O.

An intimate mixture of boiled linseed oil, rosin, gum mastic, and turpentine.

843. *Fireproofing and Fire Resistance*

See also No. 1913.

1956. Toriumi, H., and Kato, T. **[Studies on fireproofing plywood. (Part 1.) The treatment of veneer and plywood with fire-retardant chemicals.]** *Wood Ind., Tokyo* 8 (7), 1953 (291, 313–6). [Jap.e.] P.R.

A number of chemicals were tested and results are tabulated. Some of the salts found suitable were NH_4 phosphates, $(NH_4)_2SO_4$ and sulphamic ammonium. Veneers treated with 10–15% $(NH_4)_2HPO_4$ gave good results. Treating temperatures of 40–60° C. were best but plywood so treated is unsuitable for exposure to weather. Tests on nail corrosion showed that NH_4 phosphate is a suitable chemical for fireproofing veneers and plywood. *From authors' summary.*

1957. Lauring, E. A. **Flame retarding composition.** *U.S. Patent* No. 2,594,937, April 24, 1952. pp. 6. P.O.

A composition to be applied to the surface of a fibre composition board, comprising a thermoplastic paint vehicle, powdered $Na_2B_4O_7.5H_2O$ as an inorganic foam-forming ingredient suspended in the paint, a pigment consisting of ca. 80% $CaCO_3$ and ca. 20% lithopone, and H_3BO_3.

1958. Eckert, L. W. **Fire-resistant coating composition [for fibreboards and the like.]** *U.S. Patent* No. 2,632,741, March 24, 1953. pp. 6. P.O.

The composition comprises a mixture of (1) $Ca(H_2PO_4)_2$ and (2) the reaction product of a mixture of amylaceous material (e.g. starch) and a dicyandiamidealdehyde resin.

1959. Eckert, L. W. **Fire-resistant coating composition [for fibreboards and the like] and method of making the same.** *U.S. Patent* No. 2,632,742, March 24, 1953. pp. 6. P.O.

The composition comprises: a mixture of (1) the heat degradation product of starch or the like and an NH_4 phosphate, (2) a dicyandiamidealdehyde resin, and (3) H_3PO_4.

1960. Pershall, E. E. **Wood preservation.** *U.S. Patent* No. 2,637,691, May 5, 1953. pp. 12 + 1 gph. P.O.

A water-resistant fire-proofing solution comprising an ammoniacal solution of an ammoniated basic Zn chloride having a composition on the dry basis between approximately $2ZnO/ZnCl_2/2NH_3$ and $4ZnO/ZnCl_2/2NH_3$.

844. *Attack by Plant Organisms*

See also Nos. 1914, 2015–7.

1961. Bavendamm, W. Mikroskopisches Erkennen und Bestimmen von holzbewohnenden und holzzerstörenden Pilzen. **[Detection and determination of wood-inhabiting and wood-destroying fungi.]** *Repr.* from H. Freund, *Handbuch der Mikroskopie in der Technik*, Frankfurt am Main. Vol. 5, Pt. 2, 1951 (819–43). 23 refs. [G.] P.R.

Includes sections on: (1) preparation of wood sections for microscopic investigation of wood fungi, (2) interpretation of microscopic observations, (3) mycelia found on wood, and (4) mycelia cultivated from wood.

1962. Costa, E. W. B. da, Matters, C. N., and Tamblyn, N. **Project P. 11: The characteristics of Australian decay and stain fungi. Sub-project P. 11–12: The identification of basidiomycete fungi in culture. Progress Report No. 1. Methods of describing the morphological characteristics of basidiomycete fungi in culture.** Division of Forest Products, C.S.I.R.O., Melbourne. 1952. pp. 13 + 1 dgm. 5 refs. Limited circulation. P.R.

The macroscopic features of the fungi are described and photographed from Petri-dish cultures; microscopic features are examined in unstained mounts, described and illustrated by line drawings. The discoloration of gallic or tannic acid in the malt-agar medium is used as the sign of the production of oxidases. A multiple-entry key based on a punched-card sorting system is being developed to facilitate identification. [Cf. *For. Abstr.* 14 (No. 3881).] *From authors' summary.*

844.1. Sap-staining and Mould Fungi

See also No. 1531.

1963. Mathiesen-Käärik, A. Eine Übersicht über die gewöhnlichsten mit Borkenkäfern assoziierten Bläuepilze in Schweden und einige für Schweden neue Bläuepilze. **[A review of Swedish bluing fungi associated with barkbeetles, and some bluing fungi new to Sweden.]** *Medd. SkogsforsknInst., Stockh.* 43 (4), 1953. pp. 74. 51 refs. [G.g.sw.] Price *Kr.*4.

An analysis of material collected between 1945 and 1952, consisting of over 850 samples containing about 40 species of blue-stain fungi associated with 8 barkbeetles on Scots Pine, 5 on Norway Spruce and 4 on both Pine and Spruce, is given in tabular form, showing the frequency of occurrence of the different fungi, *Ophiostoma* spp. being the commonest. Some, e.g. *O. canum* with *Blastophagus minor*, *O. clavatum* with *Ips acuminatus* and *O. brunneociliatum* with *I. sexdentatus*, all frequently found on Pine, appear to be specific to certain beetles; *O. penicillatum*, the fungus most commonly found on Spruce, is associated with different beetles, e.g. *Ips typographus*, *Hylastes cunicularius*, *Hylurgops palliatus*. All these fungi and beetles are frequent on freshly felled, exposed, stacked logs, not lying directly on the ground. *O. pini* and *O. penicillatum* are important on Pine logs lying in damp sites. Both are tolerant of varying conditions, being found on freshly felled and on dried-out logs. *O. piceae*, associated with all the beetles and found in varying conditions, is not found on newly attacked logs, and *O. coeruleum* is found mainly on dried-out logs with various beetles. Species less frequently found include *O. tetropii*, *O. galeiformis*, *O. ips*, *O. albidum*, *O. olivaceum*, all associated with particular beetles, and *O. minutum*, *O. polonicum*, *O. floccosum*, *O. pluriannulatum*, and *O. coerulescens*. Blue-stain fungi introduced by beetles normally disappear after a summer, *O. pini*, *O. penicillatum* and *O. coeruleum* being among the most persistent. Some fungi, e.g. *Trichosporium* spp., disappear during floating. Others, e.g. *O. canum*, can develop in sawn timber after floating, though less vigorously than in the forest; after the timber dries out they generally disappear. Examples of fungi resistant to drying out

are *O. pini*, *O. piceae*, *O. coeruleum*, *Pullularia* spp. and *Cladosporium* spp. Some *Graphium* spp. and a *Phialophora* sp. not found in the forest were common in floated timber and planks. *O. ips*, *O. galeiformis*, *Tuberculariella ips*, *Graphium album* and *G. aureum*, species new to Sweden, and the following new species—*O. brunneo-ciliatum*, *O. albidum*, *Monilia ferruginea* and two *Graphium* spp.—are described. [Cf. *For. Abstr.* 13 (No. 971).]

1964. **Cause and prevention of blue stain in wood.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. 225 (rev.), 1952. pp. 4. P.R.

1965. JACQUIOT, C. Le bleuissement des bois abattus ou débités. **[Blue-staining of felled or converted wood.]** *Étude tech. Inst. nat. Bois* No. 10, 1952. pp. 5. [F.] P.R.

Contains general information and recommendations on the handling of logs and converted timber, and chemical treatment with pentachlorophenol plus BHC.

1966. COSTA, E. W. B. DA. **The use of chemicals in the control of blue stain in *Pinus radiata*.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 194, 1953 (3–4, 7).

Describes simple equipment for mechanical and hand dipping or spraying boards immediately after sawing and gives suitable formulae for preservatives containing Na pentachlorophenate, borax and water with or without inclusion of an organic Hg compound. Also discusses safety precautions in using the preservatives, and the protection of logs with pentachlorophenol when some time elapses between felling and sawing.

1967. ZABEL, R. A. **Lumber stains and their control in northern White Pine.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (36–8). 16 refs.

Discusses various stains caused by different fungi and their control in logs and during the seasoning of sawn timber of *Pinus strobus*. [Cf. *For. Abstr.* 11 (No. 3078).]

1968. SAVORY, J. G. **Surface mould on Obeche.** *Timber Technol.* 61 (2164), 1953 (81–2). P.R.

The sap-stain fungi responsible for discoloration of Obeche are *Cladosporium herbarum* (olive-brown stain) and *Penicillium* sp. (green). Preventive measures and methods of removing stains are described.

844.2. Wood-destroying Fungi

See also Nos. 1494–1509.

1969. EADES, H. W., and ROFF, H. W. **The regulation of aeration in wood soil contact culture technique.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (68–71, 94–5). 2 refs.

Experiments on the culture of fungi by the Leutritz method [cf. *For. Abstr.* 9 (No. 2272)] showed that more consistent results were obtained in jars with a glass vent tube fitted to the lid, than in those with loosely or tightly fitting screw caps without other ventilation.

1970. FINDLAY, W. P. K. **Influence of sample size on decay rate of wood in culture.** *Timber Technol.* 61 (2166), 1953 (160–2). 2 refs. P.R.

Tests with heartwood samples of 5 species have shown that the amount of decay increases as the volume of the sample is reduced. It is suggested that the rate of gaseous diffusion into and out of the sample may be the controlling factor. *From author's summary.*

1971. BAVENDAMM, W. Pflanzliche Holzschädlinge. *Paxillus panuoides* Fr. **[Plant wood pests. *P. panuoides*.]** *Holz Roh- u. Werkstoff* 11 (8), 1953 (331–2). 10 refs. [G.] P.R.

1972. ASANO, I., and FUJII, M. **[A study on decay of *Fagus crenata*.]** *Wood Ind., Tokyo* 8 (3), 1953 (97, 118–23). [Jap.e.] P.R.

Results of measurements on loss of weight, compressive strength and impact-bending strength, and of chemical analyses of samples of *F. crenata* decayed by *Poria vaporaria* and *Polystictus hirsutus*, are given in graphs and a table [with English legends]. *From authors' summary.*

1973. **Protection against wood-destroying organisms.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1903–13, 1952. pp. 19 + 1 tbl., 1 map. 33 refs. P.R.

A review of literature.

1974. PAULI, O., and TECHNAU, G. Verfahren zur Bekämpfung des Verstockens von Laubhölzern, insbesondere von Rotbuchenstammholz. **[Method of controlling the incipient decay of wood of broad-leaved species, in particular of Beech stemwood.]** *German Patent* No. 837,923, May 2, 1952. pp. 2. [G.] P.O.

The cut surfaces are treated with a reducing agent, e.g. $NaHSO_3$.

1975. JACQUIOT, C. Les échauffures des bois abattus. **[Incipient decay in felled wood.]** *Étude tech. Inst. nat. Bois* No. 11, 1952. pp. 6. [F.] P.R.

Discusses the prevention of incipient decay in Beech, conifers, and Ash, 'sanitation' measures, and chemical treatment with different fungicides.

1976. SCHEFFER, T. C. **Treatment of bilgewater to control decay in the bilge area of wooden boats.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (72–8, 95). 4 refs.

An investigation was made of the possibility of reducing decay below the water line, in boats operating in fresh or brackish water or hauled out of the water for much of the time, by adding fungus-inhibiting chemicals to the bilge water. Laboratory tests on the efficacy of different chemicals were made by assessing the decay resistance of treated blocks of species commonly used in boats, and the retardation of growth of wood-attacking fungi by solutions of the chemicals in Petri-dish toxicity tests. The chemical damage to the wood, decay resistance shown, effect of treatment on the natural resistance and physical quality of the wood, the reaction of the chemicals with cotton, rayon and nylon bags, and the general suitability of the chemicals, are discussed. Further tests were made on pentachlorophenol and orthophenylphenol, the most promising of the chemicals. In Petri-dish tests, growth of the test fungi (5 named fungi and a group of miscellaneous moulds) was completely stopped by saturated solutions of these 2 chemicals and except for *Polyporus*

versicolor and *Ceratostomella pilifera*, also by dilutions ranging from $\frac{1}{5}$ to $\frac{1}{2}$ saturation value. In 10 of the 12 tests the fungi were killed outright by the saturated or more dilute solutions (exact chemical concentrations are not known but were very low). In preliminary tests with fresh and salt water the chemicals caused no obvious increase in corrosion to wire nails or aluminium strips.

1977. **Prevention and control of decay in dwellings.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. 251 (rev.) 1952. pp. 6. P.R.

845. *Attack by Animals*

See also No. 1914.

845.1. Marine Borers

1978. RALPH, P. M., and HURLEY, D. E. **The settling and growth of wharf-pile fauna in Port Nicholson, Wellington, New Zealand.** *Zoology Publication from Victoria University College, Wellington* No. 19, 1952. pp. 22. 10 refs. P.R.

Describes the results of tests with wooden blocks showing deterioration as a result of attack by *Bankia australis* and *Limnoria quadripunctata*.

845.2. Terrestrial Borers

See also Nos. 1591, 1593–4.

1979. ROSEL, A. **Project P. 15. The biology of *Lyctus*. Sub-project P. 15–10. Oviposition and early larval activity in *Lyctus brunneus* Steph. Progress report No. 1.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 8 + 8 photos. 3 refs. P.R.

1980. WORLEY, K. H. **New South Wales brushwood groups.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (1), 1953 (8–9).

Gives the rating for susceptibility to *Lyctus* of some 40 timbers, in 4 groups, designed to bring together timbers of equal stumpage rates, the first 2 groups containing the most valuable species, and groups 3 and 4 cabinet and case timbers respectively.

1981. BECKER, G. Untersuchungen über die Eignung von Kontaktinsektiziden für den Holzschutz. **[Investigations on the suitability of contact insecticides for the protection of wood.]** *Holz Roh- u. Werkstoff* 11 (2), 1953 (45–50). 14 refs. [G.g.] P.R.

Tests with (♂) imagos of *Hylotrupes bajulus* have shown that the insecticides used (DDT, BHC, parathion, and 'M 410') are more toxic to this species than to other beetles, and probably more toxic to imagos in general than to other developmental stages. Tests with *H. bajulus* larvae give widely differing results even for larvae of the same age and size, but it is evident that adult larvae are much more immune to insecticides than the younger ones. Tests with the 1st-instar larvae of *H. bajulus* and *Anobium punctatum* show that the toxicity of different insecticides to these larvae varies within extremely wide limits, the third determining factor being the duration of test. In general, *Anobium* 1st-instar larvae are much more resistant than those of *Hylotrupes*, the ratio of toxic effect sometimes amounting to 1 : 20,000, but parathion is slightly more toxic to the former than to the latter. Some insecticides maintain their toxicity for a long period (DDT, BHC, parathion). Tests with imagos and larvae were made on wood specimens coated with a solution of the respective insecticide in acetone, while tests with 1st-instar larvae were made on specimens impregnated with the insecticide.

1982. BLETCHLY, J. D. **The effect of hydrogen cyanide on the eggs of the common furniture beetle, *Anobium punctatum* (Deg.).** *Bull. ent. Res.* 44 (3), 1953 (415–8). 4 refs.

Complete mortality was obtained by fumigating eggs of *A. punctatum* with HCN at a concentration of 4·25 mg./litre and 4 concentration/time exposures, varying from 4·3 to 42·5 mg./hr. per litre. The eggs are less resistant than the larvae, so that commercial treatments used for infested wood will also kill the eggs. *From author's summary.*

1983. MCMULLEN, M. J. **The sterilisation of timber by fumigation.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 6 (3/4), 1952 (20–4).

Describes with illustrations some different methods and equipment used in fumigating with MeBr and gives some examples of its successful use. [Cf. *For. Abstr.* 13 (No. 4347).]

1984. MCMULLEN, M. J. **The field sterilization of Turpentine [*Syncarpia laurifolia*] piles.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (1), 1953 (16–8). Also in *Aust. Timb. J.* 19 (8), 1953 (569).

Describes the successful fumigation with MeBr under tarpaulin sheeting of a shipment of *S. laurifolia*, refused clearance because of a heavy infestation with barkbeetles. The technique [cf. *For. Abstr.* 13 (No. 4347)], equipment and costs are discussed.

1985. SCHMIDT, H. Frisches Bauholz und Käferbefall. **[Green constructional timber and beetle attack.]** *Holz-Zbl.* 79 (145), 1953 (1542). [G.]

Describes the following beetles found in Germany in green or moist Pine and Spruce building timber: *Criocephalus rusticus, C. polonicus, Tetropium luridum castaneum, T. fuscum.*

1986. GRAHAM, K. **Report on ambrosia beetle control in the Nimpkish Valley, B.C.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (5), 1953 (3–4).

Several large-scale experiments were made using procedures that had given promising results elsewhere on Vancouver Island in protecting Western Hemlock and Douglas Fir logs in the forest from ambrosia beetles (*Trypodendron* sp.). BHC was applied in a water emulsion containing 0·4% of the γ isomer, at a dosage of 1 gal./100 sq. ft. of log surface. The emulsion was made up from a grade of BHC containing 36% γ isomer, dissolved in Velsicol AR50 and rendered emulsifiable in water with Antarox A-400. Applications were made in several areas of different degrees of infestation and to both stacked and unstacked logs; they began on 15 April and ended 2 May. *Trypodendron* adults appeared in flight on 4–5 May in very great numbers. Except in one area of extremely low population, all the treatments failed to give any practical protection, despite the killing of large numbers of attacking

beetles by the residual action of the BHC. Some Douglas-Fir logs though drenched with spray, received as many as 200 attacks per sq. ft. of log surface, and the beetles produced successful broods which eventually emerged in July. The weather was dry, so there was no leaching away of the insecticide. No satisfactory reason can yet be advanced for the failure on this occasion.

1987. Buclon, F. **Log preservation against pinhole borers in tropical climates.** *Timber Technol.* 61 (2169), 1953 (339–40). P.R.

Presents graphed results of some tests made by a French firm in French West Africa on the efficacy of insecticides based on pentachlorophenol and BHC in controlling pinhole-borers in logs of several African species.

1988. Exploitation des bois en grumes sous les climats tropicaux. [**The exploitation of logs in tropical climates.**] *Rev. int. Bois* 20 (186), 1953 (207–9). [F.]

Investigations made in Cameroun and the Ivory Coast by the Société Xylochimie showed that logs of *Terminalia superba* and *Pycnanthus kombo* were heavily attacked by pinhole borers within 48 hours of felling; the importance of applying insecticides immediately after felling is stressed.

1989. Alliot, H. Recherches sur la protection des bois en grumes sous les climats tropicaux. **[Research on the protection of logs in tropical climates.]** *Bois For. Trop.* No. 30, 1953 (43–52). [F.]

Reports in detail investigations of borer attack on *Terminalia superba* in the Cameroons; the data are given in a series of graphs, showing (1) number of holes made during the dry season; (2) comparison of number of holes (*a*) on the upper and under sides of logs, (*b*) in the dry and in the rainy seasons, (*c*) on barked and on unbarked logs; (3) results of treatment with various formulas containing BHC. It is concluded that *T. superba* needs protection even when there is little delay in extracting and transporting logs from the forest, since serious damage is done within a fortnight of felling; that treatment should be given as soon as possible after felling, since the insects appear almost at once and bore very rapidly; and that the bark gives only a slight measure of protection and should be removed before treatment except where very tight.

Of the preservatives used, it was found that an anthracene-oil emulsion of BHC definitely attracted the beetles, and further tests showed that this and some similar oils (e.g. thio-ichthyolithic oils and coal-tar oils) were powerful attractants. The use of volatile emulsifying solvents proved more satisfactory, particularly at concentrations assuring a 2% content of the γ-isomer of BHC; the addition of stickers gave no improvement. The duration of protection given by these formulas is, however, too short to commend them. A preservative (P1) containing two wettable powders which form, by thixotropic reaction, an insoluble film on the surface of the log and need no solvent but water, gave excellent results, ensuring total protection for 6–8 weeks and thereafter gradually diminishing protection; even after 4 months, treated logs had only 17% of the number of holes found in controls. This formula has the additional advantage of using relatively small quantities of the γ-isomer and of being, in consequence, relatively cheap. Finally two organic solutions (D1 and D2) were tested; these are entirely synthetic products, containing no attractive oils, in which the active principles (BHC and chlorophenol) are strongly fixed. These gave by far the best results, ensuring total protection for at least 5 months. They have the great merit of being applicable to wet logs (e.g. after heavy rain) and of not being washed off even by heavy rain, and so being applicable to logs that are to be floated. They form, with the sap exuding from the ends of the logs, a sort of adhesive viscous 'mousse' from which the water is gradually extruded, leaving the active principles behind. This effectively seals the ends of the logs, slowing down the outward movement of moisture and thus diminishing the risk of cracks. The synthetic solvents used in these formulas cause a progressive deterioration of rubber and the use of a compressed-air spray with no rubber parts is recommended.

The names and formulas of these preservatives (some of them commercial preparations and some laboratory products) are not given, but further information and practical instructions can be obtained from the Centre Technique Forestier Tropical at Nogent-sur-Marne.

845.3. Termites

See No. 1792.

846. *Steaming*

1990. Lukić, N. O nekim svojstvima parene i neparene bukovine Majdanpečke domene. [**Some properties of steamed and unsteamed Beech wood from the Majdanpek estate.**] *Glasn. šum. Fak., Beograd* 6, 1953 (51–66). 10 refs. [Serb.serb.g.]

It was found that steamed Beech wood (1) has a slightly smaller nominal density (0·572 g./c.c., with a scatter from 0·53 to 0·62) than unsteamed wood (2) (0·58 g./c.c., with a scatter from 0·53 to 0·63). Shrinkage was greater for (1) than for (2), viz.: radially 6·02 and 4·93%; tangentially 13·80 and 12·05%; and by volume, 19·10 and 16·63%. The average shrinkage/nominal-density ratio was 33 for (1), and 29 for (2). In all, 7 stems were tested; the steaming was done with steam at 7·5 atm. or with saturated steam at 102° C. In wood steamed at 102° the compression strength was reduced by ca. 12%, and the bending strength increased by ca. 10%, as compared with (2).

847. *Drying* (*Seasoning*)

See also Nos. 1880, 1913–4, 1943, 2023–4, 2063.

1991. **List of publications on the seasoning of wood.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*446, 1952. pp. 18. P.R.

1992. Stevens, W. C. **Factors affecting the drying of wood.** *Timber Technol.* 61 (2165), 1953 (124–6).

Discusses the effects of the temperature of the drying medium, its humidity, and its rate and direction of movement.

1993. **Comparative strength of air-dried and kiln-dried wood.** *Tech. Notes U.S. For. Prod. Lab., Madison* No. 180 (rev.) 1952. pp. 1. P.R.

Some 150,000 tests made at Madison on kiln-dried and air-dried specimens of 28 common species show that good kiln-drying and good air-drying have the same effect on the strength of wood.

1994. CHATTERJEE, K. N. **An empirical formula for determination of loss of firewood by driage.** *Indian For.* 79 (10), 1953 (563–7). 3 refs.

Illustrates the application to *Mangifera indica*, *Bombax malabaricum*, *Ficus bengalensis*, *Shorea robusta*, *Eugenia jambolana* and *Machilus duthei* firewood, of the formula $Q = a + (b \times c^t)$, where Q = the % of original wood volume at any time t, and a, b and c are constants.

1995. MILLETT, R. S. **Drying rate of pulpwood in the woods and in the open.** *Pulp Paper Mag. Can.* 54 (12), 1953 (166 . . 170).

Mixed Spruce and Balsam Fir pulpwood was piled half in the woods in light shade, half in a yard in the open at the Ottawa forest products laboratory. Periodic weighings were made over a period of about 20 months. Results are shown in a graph and table. The final weights of the material piled in the forest were considerably higher than those of wood piled in the open. The latter dried a little during late Sept. and early Oct., not at all during the winter, again dried a little in May and then dried rapidly through the summer until late Aug. No weighings were made on the material in the woods during the winter or spring, there was little drying before mid-June but thereafter it became rapid; there was little drying during the second winter. It is emphasized that winter storage in the woods does not improve floatability but that summer storage does so.

1996. **Some air seasoning and basic density observations on softwood plantation species.** *Aust. Timb. J.* 19 (5), 1953 (349–50).

Results of drying sample boards of exotic softwoods (9 species of Pine and *Callitris cupressiformis*) indicated that all species would dry rapidly under cover and that degrade, other than blue-stain, would be negligible. There was little difference in rate of drying between the species. Times of drying to various moisture contents are shown, and shrinkage figures to 15% m.c. and basic densities for the different species are tabulated.

1997. KYDRYŃSKA, M. Suszenie tarcicy sosnowej na składach tartacznych. Badania wstępne. [**Air-drying of sawn Scots Pine in sawmill depots. Preliminary investigations.**] *Prace Inst. Bad. Leśn.* No. 90, 1953. pp. 59. 27 refs. [Pol.pol.russ.g.]

The process of air-drying of sawn Pine stacked in June, July, Aug. and Sept. 1949, and dried until May 1950, is characterized by a curve which tends, first steeply and then nearly asymptotically, to a certain final value of moisture content; after attaining the minimum, the m.c. increases again to a certain maximum, to fall again to another minimum. The first minimum was reached roughly in October, and the intermediate maximum in January. The graphed and tabulated results show that (1) the drying rate depends clearly on the thickness of timber, thus $\frac{5}{8} \times 5$ in. boards dried, in favourable conditions, from 67·5 to 16·2% m.c. (air-dry) within 13 days; (2) the period of drying is almost independent of the initial m.c. The author recommends removing the timber from stacks immediately the first m.c. minimum has been reached, and storing in tight sheds. An increase of drying rate for thin and medium-thick timber, and better control of the drying of the thicker assortments, can be attained by the use of stickers of proper size.

1998. **Air seasoning observations on boric treated and untreated scrubwoods of Queensland.** *Aust. Timb. J.* 19 (5), 1953 (350, 353–4).

Means of the drying times of 4 sample boards (2 treated with H_3BO_3 and 2 untreated) from each of 16 hardwood species showed initial drying to be more rapid for treated boards, but total drying times for treated and untreated to be practically identical. There was less degrade after seasoning in the treated boards.

1999. [**Seasoning of some Indian timbers.**] *For. Res. India Burma 1949/50, Pt. 1* 1953 (68–9).

Notes on kiln seasoning of *Terminalia belerica*, *Grevillea robusta*, *Careya arborea*, *Pinus longifolia*, *Albizzia moluccana*, *Zanthoxylum rhetsa* (veneer), and *Lannea grandis* (veneer); and air seasoning of *Chikrassia tabularis*, *Grewia tiliaefolia*, *Pterospermum acerifolium*, *Calophyllum tomentosum*, *Lagerstroemia flos-reginae*, *Hardwickia pinnata*, *Zanthoxylum rhetsa*, *Heritiera minor*, *Dipterocarpus indicus*, *Terminalia myriocarpa*, and *Shorea robusta*.

Several species were tested for accelerated air seasoning, making use of solar radiation, several designs of hot-air chambers heated by the sun being tried. The results show that sufficient heat can be obtained in this way and that there is an appreciable difference in the period of seasoning compared with seasoning in the open air.

A test on the girdling of standing trees as a means of partial seasoning was in progress in Bihar. It was noticed that *Schleichera trijuga* showed no sign of drying even 2 years after girdling. *Anogeissus latifolia* began to dry 16 months after girdling, by which time the leaves and bark had fallen off.

Terminalia tomentosa and *Pterocarpus marsupium* dried down to ca. 20% m.c. to a depth of 2 in. in 2 years.

2000. LEISCHNER, G. Procédé de séchage de pièces de bois et dispositif pour sa mise en oeuvre. [**Method of seasoning pieces of wood.**] *Swiss Patent* No. 273,478, May 16, 1951. pp. 5 + 3 dgms. [F.] P.O.

At least a part of the surface along the grain is in contact with a water-permeable sheet, the other surface of which is swept by an air current, while the wood is being heated.

2001. OSMOSE HOLZIMPRÄGNIERUNG CARL SCHMITTUTZ. Perfectionnements apportés aux procédés pour le séchage du bois. [**Improvements in methods of wood seasoning.**] *French Patent* No. 996,559, Dec. 21, 1951. pp. 2. [F.] P.O.

Wood is coated with oil plus at least one substance capable of retarding the evaporaton of water (e.g. silicic acid or collodion), after which it is air-dried. A water-soluble wood-impregnating substance may be added to the coating.

2002. Eisenmann, E. Fahrplanmässiges Holztrocknen in der Praxis. **[Wood seasoning in practice in accordance with a time-table.]** *Repr.* from *Holz-Zbl.* 78 (18–20), 1952. pp. 6 + 1 gph. + 1 tbl. [G.g.] P.R.

Includes a psychrometric graph showing, for air velocities above 2 m./sec., the relationships between temperature, relative air humidity (saturated), and moisture content (m.c.) of wood, in accordance with the law of hygroscopic equilibrium. A table gives the values to which the equilibrium m.c. should be adjusted in accordance with wood species, condition (green, air-dry), and duration of seasoning or actual m.c. Examples of the kiln-drying of 25-mm. coniferous wood are given in graphs and tables. The kiln-drying process is described in detail, including the taking of samples and determination of m.c.

2003. Taranenko, A. D. Uproščennyĭ daljnodeĭstvujuščiĭ psihrometr. **[A simplified distance-action psychrometer.]** *Lesn. Prom.* 12 (12), 1952 (25–7). [Russ.]

This psychrometer, which can be used in kilns having forced longitudinal draught, embodies a bent pipe with 2 widened ends, one of which is in the compression, and the other in the expansion zone of the kiln; the central part of the pipe is led out into the control room and fitted with the usual psychrometer equipment with automatic water supply for the wet bulb.

2004. Lane, P. H. **A small electrically heated dry kiln.** *Tech. Note Tenn. Vall. Auth.* No. 11, 1952. pp. 7 + 2 dgms.

Describes a cross-circulation, electrically heated kiln that will hold ca. 6000 bd. ft.

2005. Keylwerth, R. **Fundamentals of high-temperature drying of wood.** *Transl. For. Prod. Lab., Can.* No. 60, 1953. pp. 5 + 1 gph. Transl. by F. Bender from *Holz-Zbl.* 75 (76), 1949 (953–4). P.R.

2006. Stemsrud, F. Høytemperaturtørk av trevirke. **[High-temperature seasoning of timber.]** *Norsk Skogind.* 7 (10), 1953 (335–41). 41 refs. [Nor.e.] P.R.

Reviews literature on the method and its uses and describes briefly with illustrations some of the kilns used.

2007. Kiefer, O. Ein neuer Weg der Hochtemperaturtrocknung. **[A new method of high-temperature seasoning.]** *Int. Holzmarkt* 43 (13), 1952 (15). [G.]

Describes briefly a kiln, heated by waste wood, manufactured and patented by Firma Maschinenfabrik Gg. Kiefer, Stuttgart-Feuerbach.

2008. Salamon, M. Faanyagok 100° C alatti és feletti hölégszárításának újabb kutatási eredményei. **[New achievements in research on hot-air drying of wood below and above 100° C.]** *Faipar, Budapest* 2 (3), 1952 (86–93). [Hung.] From *Hung. tech. Abstr.* 5 (1), 1953 (No. 41). I.F.B.

Tests below 100° C. have shown that the drying rate down to the fibre-saturation point can be ncreased if, after 2 days of drying, wood is subjected to short-period 'cooking'. It is claimed that, using this procedure, 25-mm. Beech can be seasoned in 5·5–6 days, provided that the kilns are closely packed with uniform pieces of wood and the air space is vertically divided by baffle plates. High air velocities must be applied at temperatures over 100° C.

2009. Fessel, F. Ein Wendepunkt der Trockentechnik durch Zerstörung und Ablösung der Strömungs-Grenzschicht. **[A turning-point in seasoning reached through the breaking-up and removal of the air boundary layer [on the timber surface].]** *Holz-Zbl.* 79 (11), 1953 (95–6). [G.]

Conventional forced-draught kilns, high-temperature kilns and the Eisenmann-type 'Quer-Kondens-Trockner' all use the same type of steady air circulation. This is claimed to be insufficient for breaking and removing the thin layer of moisture-laden air that clings to the timber surface, and prevents the transfer of heat from air to wood and the transfer of moisture from wood to air. Besides the hydro-extractor with spiral air circulation [cf. *For. Abstr.* 13 (No. 1674)] a new kiln has been developed by Eisenmann, which is said to remove this boundary layer very efficiently. It is the 'Turbo-Kondens-Trockner' (kiln with turbulent air circulation and partial moisture condensation), differing from the 'Quer-Kondens-Trockner', in having 2 pivotable shutters level with the top of the stack on either side of the fan. These shutters automatically close and open alternately, thus generating within the kiln successive compressions and expansions of the air; the waves of different pressure so formed break up and remove the boundary layer. Four examples of seasoning are given, the first figure being the time of seasoning in a modern forced-draught kiln, the second the time in a kiln with turbulent air circulation and partial condensation of moisture, the third, the time in a hydro-extractor with spiral air circulation: (1) Beech 50 mm. thick, from 70 to 8% m.c.: 150, 105, 75; (2) ditto from 30 to 8%; 80, 55, 40; (3) coniferous wood 25 mm. thick, from 70 to 8%: 19, 13, 9·5, and (4) air-dry coniferous wood, from 30 to 8%: 12, 8·5, 6 hr.

2010. Stadler, S. Einen grossen Schritt weiter durch Klima-Spiral-Zentrifugen. **[A substantial advance achieved by hydro-extractors with spiral air circulation.]** *Repr.* from *Holz* 6 (9), 1952 (213–7). [G.] P.R.

Presents graphed results of practical seasoning of Beech scantlings 25–80 mm. thick in an Eisenmann-system hydro-extractor with spiral air circulation [cf. *For. Abstr.* 13 (No. 1674)], the maximum temperature applied being 75° C. Seasoning times required to reduce the m.c. from ca. 100% to ca. 9–10% were: for scantlings 80 mm. thick, 300 hr.; 60 mm., 200 hr.; 50 mm., 150 hr.; 40 mm. (up to 50 mm. wide), 110 hr., and for 25 mm. thick (up to 100 mm. wide), 57 hr. A batch of scantlings 55 mm. thick was dried from 80% to 12·5% m.c. in 107 hr. (total time), the average temperature being 70°; the drying rate was rather too high, and some end-splits up to 3 cm. deep developed; the average quality was good, and the m.c. differences only ± 2·4%. Another batch of scantlings 82-mm.

thick was dried at an average temperature of 75° from 110% to 14% m.c. in 240 hr. drying time; only 3% of pieces showed end splits and checks, but there were no inner splits; m.c. differences ± 3·2%. The process of seasoning of 780 × 62 × 62-mm. scantlings from 85% to 9% m.c. within 200 hr. is described in detail.

2011. Jacobsen, H. Beitrag zur Trocknung von Buchenholz durch Zentrifugalkräfte. [**Seasoning of Beech wood by centrifugal force.**] *Holz Roh- u. Werkstoff* 11 (10), 1953 (389–92). 6 refs. [G.g.] P.R.

Laboratory tests with 2 × 2 × 6·5-cm. samples of *Fagus sylvatica* (the longest dimension ∥ or ⊥ to the grain) have shown that: (1) centrifuging (at 1500 and 3000 rev./min.) accelerates drying considerably, there being no stop at the fibre-saturation point; (2) when the samples were placed in centrifuge tubes, thus excluding the effect of air circulation, with a layer of a hygroscopic substance, e.g. $CaCl_2$, at the bottom of the tube, their drying by centrifuging proceeded faster than in control tests without centrifuging. Similar effects have been found with Pine wood, which showed a deposit of resinous matter at the bottom of the centrifuge tube.

2012. Keylwerth, R., and Kübler, H. Holztrocknung in heissem Teeröl und die Ermittlung der Trockenzeit bei Hochtemperaturtrocknung. [**Wood seasoning in hot tar-oil, and evaluation of seasoning periods for high-temperature seasoning.**] *Holz-Zbl.* 78 (12), 1952 (135–6). [G.g.]

Experiments with Pine planks 1-m. long, of 60, 110 and 150% initial moisture content (m.c.), seasoned by immersion in tar-oil at 110, 115, 120° C., with end-penetration prevented, yielded the following preliminary results: (1) the period of seasoning varies as the 1·6thp ower of the plank thickness; (2) it varies inversely as the difference between the temperature of the oil bath and 100° C.; (3) the period of seasoning (in hours) can be estimated from the formula $Z = 5{\cdot}7 \times \log (u_i/u_f)\ (d^{1{\cdot}6}/(t - 100))$, where u_i and u_f are the initial and final m.c., respectively, d the thickness in cm., and t the oil temperature in ° C. It was found that for conventional high-temperature seasoning the numerical coefficient is 8·5 instead of 5·7. The ratios of the seasoning periods for tar-oil treatment, high-temperature seasoning and 80° C. seasoning are ca. 0·65/1/5.

2013. McMullen, M. J., and Downes, K. **A new method of wood seasoning.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 7 (1), 1953 (10–2).

[Cf. *For. Abstr.* 14 (No. 2846).] *Eucalyptus maculata* in ½-in. squares was dried in 10 days in a mixture of petroleum ether and diacetone alcohol from 60 to 10% m.c. when the solution was agitated periodically, but only to 17% without agitation. No shrinkage was noted on the ends of the samples and in the middle only 1% change in dimension as against 4% in air-dried controls. Battery separators of *Araucaria klinkii* dried in the same way showed shrinkage of 0·7% across the width and a 4% increase of thickness, controls showing 8% shrinkage in both directions. The treated samples did not vary when exposed to the air, and appeared to be tougher than air-seasoned separators. Further work, on *Eucalyptus gigantea*, is proposed. The reaction slowed down after 24 hr. as the diacetone alcohol was precipitated from the solution by the water, but the streaming of water from the timber began again when fresh solution was used. The bottom layer (mainly diacetone alcohol, and 10% water with some petroleum ether) could be siphoned off and the water removed by SiO_2 gel, anhydrous Na_2– or $MgSO_4$, or the bottom layer could be distilled by heating to 130° C., leaving only the diacetone alcohol. The quantitative effect of stirring on the speed of reaction has not yet been determined. Dyes were used in an attempt to discover the reactions taking place and a tentative theory is presented. The method is promising for small-scale drying of certain goods where seasoning defects are inadmissible (e.g. engraved printers' blocks) but it is uncertain whether it can be economically used in large-scale commercial seasoning.

848. *Timberyard Practice. Handling and Storage of Timber*

See also Nos. 1863, 1913.

2014. Peck, E. C. **Storage and handling of lumber at wholesale and retail yards and consumer plants.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1919, 1952. pp. 17 + 15 photos + 1 gph. 3 refs. P.R.

Makes recommendations based on experimental work and field experience of the Madison staff, dealing with the storage yard, pile roofs, open sheds, handling of individual boards, and handling of lumber in packages.

2015. Benoit, J. Un bon procédé de conservation des bois: l'immersion des grumes en eau douce. [**A good method of wood preservation; the immersion of logs in fresh water.**] *Bois For. Trop.* No. 31, 1953 (42–9). 7 refs. [F.e.span.]

Logs of Ilomba [*Pycnanthus kombo*], Samba [*Triplochiton scleroxylon*], and Fraké [*Terminalia superba*] immersed for 11 months in a log pond, were perfectly free from stain, decay, and insect attack. The general question of such storage is discussed.

2016. Hansbrough, J. R. **Storage of northern hardwood logs and bolts.** *J. For. Prod. Res. Soc.* 3 (3), 1953 (33–5, 92).

Discusses methods of reducing fungus damage by immediate conversion, chemical spraying, end coatings, spraying intermittently or continuously with water, or immersing in water. Figures are given to show that Birch logs stored under continuous spray or under water will yield nearly 50% high-quality veneer, a yield comparable in quality and quantity with that from freshly cut logs.

2017. Fronius, K. Berieselung von Rotbuchenrundholz. [**Sprinkling of Beech roundwood.**] *Holz-Zbl.* 79 (102), 1953 (1099). [G.]

Recommends an intense 'spray' instead of gentle sprinkling, and describes the use of a circular and a sector-type sprinkler.

2018. Crow, G. B. **Timber storage sheds.** *Timber Technol.* 61 (2166), 1953 (173–5). P.R.

Discusses the dimensions of stacks, access and circulation between the stacks, spans and clearances, and the material and construction of the sheds.

2019. MATHEWSON, J. S. **Electrically operated wood-element hygrostats for control of moisture fluctuations in lumber stored in closed sheds.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1140 (rev.) 1953. pp. 3 + 2 photos + 3 gphs. + 1 tbl. P.R.

Describes and illustrates the design and operation of a hygrostatic device, the sensitive part of which is a $1\frac{1}{8}$ (tangential) × $\frac{13}{16}$ (radial) × $\frac{7}{32}$-in. specimen of Western White Pine sapwood; the shrinking and swelling of the wood with changes in atmospheric conditions opens and closes the electrical heating switch. Using this device, it was possible to maintain the moisture content of open-piled shiplap and joists between 7 and 8% during a period of 11 months at very low temperatures.

849. *Miscellaneous*

2020. SJAVCILLO, S. V., and DANILINA, A. F. Degazacija drevesiny, zaražennoï ètilovoï židkostjju (tetraètilsvincom). [**'Degassing' of wood contaminated with lead-tetraethyl.**] *Gigiena i Sanitarija, Moskva* 1952 (9), (24–6). [Russ.] L.S.

[Cf. *For. Abstr.* 13 (No. 3321).] Presents results of tests on the removal of $Pb(C_2H_5)_4$ from wood by using chlorinated lime, dichloramine-T, SO_2Cl_2 and Cl_2. It can be completely eliminated from wood not contaminated deeper than 0·5 cm., by using one of the following substances dissolved in dichloroethane: SO_2Cl_2 (15%), Cl_2 (5%), or dichloroamine-T (10%) which is lasting and does not affect wood strength properties. If the depth of contamination exceeds 0·5 cm., the wood should be burned.

85. GRADING OF WOOD AND WOOD PRODUCTS

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 1249, 1625, 1647, 1739, 1850, 1881–3.

2021. **Sloping grain in timber.** *Trade Circ. For. Prod. Aust.* No. 48, 1952. pp. 17. P.R.

Supersedes Circular No. 13 'Cross, diagonal and spiral grain in timber'.

2022. HEPTING, G. H., ROTH, E. R., and LUXFORD, R. F. **The significance of the discolorations in Yellow-Poplar [*Liriodendron tulipifera*] veneers.** *Rep. U.S. For. Prod. Lab., Madison* No. 1375 (rev.), 1952. pp. 10. P.R.

Cf. *For. Abstr.* 5 (260).

2023. BIELCZYK, S. Wpływ niektórych czynników na pękanie surowca bukowego. [**Effect of some factors on the checking of Beech wood.**] *Prace Inst. Bad. Leśn.* No. 89, 1953. pp. 48. 13 refs. [Pol.russ.e.]

Presents the results of tests on logs from 400 sample trees felled in two Beech regions of Poland: Pomerania (along the Baltic coast) and the Carpathian mountains. The splits observed in logs can be classified into 3 groups, viz. (1) primary splits formed during felling by the release of stresses in living trees; (2) secondary splits caused by drying, and (3) combined splits, i.e. primary splits enhanced by drying. Beech from the Carpathians is more liable to splitting than that from Pomerania. In relation to tree height, it has been found that the area of the split at the butt end increases by 50 sq. mm. for every metre of height. There is also a distinct relationship between the area of the split and the mean diameter of the stem. Cutting very near to ground level reduces the split area of Carpathian Beech by ca. 50%. The primary splits show no correlation with moisture content of green wood, % of false heartwood, log length, or diameter of cross-section.

2024. DIÉNES, L. A kemenyfapalló száradásának lefolyása és mozgásának törvénye a tölgyfa száradásának alapján. [**The process of drying and the law of shrinking and swelling of hardwood boards with special reference to the drying of Oak.**] *Faipar, Budapest* 2 (2), 1952 (36–41). [Hung.] From *Hung. tech. Abstr.* 5 (1), 1953 (No. 40). I.F.B.

A patch with moisture content above saturation point remains after seasoning on either side of the vertical plane of symmetry of a hardwood board sawn either radially or tangentially. The location of such patches is determined by medullary rays, the differing length of which causes different rates of evaporation from the surface, with consequent shrinkage or buckling.

2025. WALTERS, C. S., and MEEK, W. L. **Mechanical debarking causes exfoliation of exterior annual ring.** *For. Note Ill. agric. Exp. Sta.* No. 40, 1953. pp. 1.

Examination of 30 European Larch posts peeled by a tight-chain barker showed exfoliation of the outer growth ring in slow-growing (25–30 rings/inch) posts. Examination of a few posts that grew at the rate of 8–10 rings/inch showed no such damage. Hand-peeled specimens from the same group of posts showed no exfoliation, regardless of growth rate.

853. *Grading of Wood in the Rough*

See Nos. 1027, 1690, 1712, 1856, 2175.

854. *Grading of Converted Timber*

See also Nos. 1675, 1856, 1858.

2026. GRANUM, H. **Quality grading of building timber.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1951, 1953. pp. 11 + 8 gphs., 1 photo. Transl. by H. E. Kijlstra from *Norsk Skogind.* 6 (11), 1952 (379–84). [See *For. Abstr.* 14 (No. 2857).] Limited distribution.

86. PULP INDUSTRIES. COMPOSITE MATERIALS MADE WHOLLY OR PARTLY OF WOODY MATTER. CHEMICAL UTILIZATION OF WOOD

See also No. 2147.

861. *Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives*

See also section 813.

2027. WATSON, A. J., WARDROP, A. B., DADSWELL, H. E., and COHEN, W. E. **Influence of fibre structure on pulp and paper properties.** *Proc. Aust.*

Pulp Pap. Ind. tech. Ass. 1952 (243–69 + 2 photos). 22 refs. P.R.

Results of tests on pulps made from successive growth rings of a 12-year-old *Pinus radiata* have shown that the factors responsible for the differences in basic density have a greater influence on most paper properties than fibre length or micellar spiral angle.

2028. **[Pulp yield from *Oxytenanthera abyssinica*.]** *Rapp. Com. spéc. Katanga 1952*, 1953 (61). [F.]

Subject to correction by a more thorough test, the yield of pulp from *O. abyssinica* (which covers large areas in Katanga) is 41% against 45–50% for Asian Bamboos. [Cf. *For. Abstr.* 13 (No. 2592).]

2029. Solomko, V. S. Vyrabotka suljfatnoĭ celljulozy iz drevesiny sibirskogo kedra. **[Manufacture of sulphate pulp from *Pinus sibirica*.]** *Bumažnaja Promyšlennostj, Moskva* 28 (6), 1953 (5–9). [Russ.] L.S.

Presents tabulated and graphed results of experimental cooks of *P. sibirica* on an industrial scale. Preliminary laboratory tests have yielded a pulp with a breaking length of 8000–10,000 m. A pulp of optimum strength properties is obtained when the amount of alkali is 15–16% of the oven-dry weight of wood. The cooking schedule should be very similar to that used for *P. sylvestris*.

2030. Castagne, E. Analyses chimiques des bois. **[Chemical analyses of wood.]** *Rapp. Inst. nat. Étude agron. Congo belge 1952*, 1953 (386–7). [F.] [Laboratoire de Recherches Chimiques à Tervuren.]

Thirteen tree species from the Belgian Congo were tested for their value as pulpwood. The most satisfactory were *Fillaeopsis discophora*, *Piptadenia leucocarpa*, *Polyalthia suaveolens* and *Deinbollia* sp., which would all provide a good-quality paper without admixture of other species. *Dialium corbisieri*, *Parinari* sp. and *Strombosia glaucescens* gave mediocre results, but the two latter might be acceptable if mixed with superior species. The other species tested (*Allanblackia floribunda*, *Dialium excelsum*, *Celtis mildbraedii*, *C. zenkeri*, and *Phialodiscus plurijugatus*) appear to have no value as pulpwood, at any rate not without admixture.

2031. Bhat, R. V., and Virmani, K. C. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XVI. Chemical pulps and writing and printing papers from Wattle woods (*Acacia decurrens* Willd. and *Acacia mollissima* Willd.).** *Indian For.* 79 (10), 1953 (526–38 + 3 sample sheets). 2 refs.

Papers made with a 60 : 40% mixture of Wattle and Bamboo pulps had good formation and satisfactory strength properties.

2032. Chittenden, A. E., Morton, D., and Pickering, G. B. **Batai wood (*Albizzia falcata* L.) from Malaya: chemical analysis, microscopy of ultimate fibres and sulphate pulp evaluation.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (214–20 + 1 photo + 3 gphs.).

Papers made from *A. falcata* sulphate pulp compare very favourably with those made from coniferous kraft pulp. Yield is satisfactory but bleachability poor.

2033. Landon, F. H. **Batai wood for paper pulp.** *Malay. Forester* 16 (4), 1953 (224–6).

Cf. preceding abstract.

2034. Jayme, G., Harders-Steinhäuser, M., and Mohrberg, W. Über die Eignung verschiedener Weidenhölzer für die Gewinnung von Papierzellstoffen. **[Suitability of different Willow woods for the manufacture of paper pulp.]** *Holz Roh- u. Werkstoff* 11 (7), 1953 (276–83). 19 refs. [G.g.] P.R.

Results of tests on wood from six 5- to 15-year-old stems of *Salix humboldtiana* (2 stems), *S. alba casteriana*, *S. pulchra*, *S. canariensis*, and *S. aglaja*. While very similar in anatomical structure to Poplar, they differed in possessing starch-containing zones in the last growth-ring. Density determinations gave results varying from 0·369 to 0·454 g./c.c. oven-dry density, the 0·454 referring to samples having 95% of tension wood. Willow is more resistant to sulphate processing than Poplar and requires a higher maximum digestion temperature (165° C.). Pulp yields are somewhat lower, but strength properties are excellent.

2035. Molnár, L., and Morvay, S. Vizsgálatok nyárfacellulóz elöállításával kapcsolatban. **[Investigations on Poplar pulp.]** *Papír- és Nyomdatechnika, Budapest* 4 (2), 1952 (18–20). [Hung.] From *Hung. tech. Abstr.* 5 (1), 1953 (No. 82). I.F.B.

When Poplar is cooked with other woods, about ½ of the Poplar is converted into an inferior-quality pulp. This proportion can be reduced if softer pulp with a lower Sieber degree is made; this, however, increases the proportion of impurities retained by the pulp. Pulping Pine and Poplar together has been found to be wrong both technically and economically.

2036. Brecht, W. Die Herstellung von Weissschliff aus Pappelholz im Schleiferei-Laboratorium. **[Manufacture of white groundwood from Poplar in a groundwood laboratory.]** *Holz Roh- u. Werkstoff* 11 (8), 1953 (293–6). 4 refs. [G.g.] P.R.

Results of preliminary tests show that the wood of a mixture of *Populus robusta* and *P. marilandica* requires less power for mechanical pulping than Spruce. The product obtained is easily dehydratable and contains relatively long fibres, but also a fair proportion of chips; the finer particles are very small, which reduces the strength properties of Poplar groundwood compared with Spruce. The resulting paper is light in weight, soft and absorbent.

2037. McGovern, J. N., and Simmonds, F. A. **Bleached semichemical pulps from mixed Eastern hardwoods for use in high-grade bond paper.** *Tappi* 36 (9), 1953 (385–90). 4 refs. P.R.

Presents results obtained at Madison in producing fully bleached neutral sulphite semi-chemical pulp from Black Cherry, Black and Yellow Birch, Red and Sugar Maple, Red and White Oak, White Ash and Beech. This pulp, if free from unbleached particles can be used up to 25% or more in No. 1 bond paper

2038. MacLean, H., and Gardner, J. A. F. **Heartwood extractives in digester corrosion.** *Pulp Paper Mag. Can.* 54 (12), 1953 (125–30). 17 refs.

Discusses the results of experiments to discover the agents corroding metal digesters in alkaline pulping, and their constitution. The corrosive agents include thujaplicins and a phenolic constituent (Western Red Cedar) and such catechol derivatives as taxifolin (Douglas Fir).

2039. Turner, C. H. **Soda pulping of *Eucalyptus gigantea*.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 1952 (89–104). 5 refs. P.R.

2040. Bland, D. E., Batterham, A., and Cohen, W. E. **Project PP. 16—Mechanism of alkaline pulping of Eucalypt woods. Sub-project PP. 16–1—Kinetics of delignification. Progress report No. 1. Delignification of *E. regnans* wood by NaOH and Na_2S.** Division of Forest Products, C.S.I.R.O., Melbourne. 1952. pp. 8 + 10 gphs. 2 refs. P.R.

Preliminary tests have shown that steel reaction bombs are unsuitable for quantitative studies of pulping. It was found that, under the conditions of the experiment, NaOH removed lignin more rapidly than did Na_2S. The efficacy of NaOH was doubled when the temperature rose from 130 to 150° C., and again when it rose from 150 to 170°. The effect of temperature was less pronounced with Na_2S. The effect of concentration on the reaction was greater for Na_2S than for NaOH.

2041. Hägglund, E. Über die chemischen Vorgänge beim Sulfatzellstoffprozess. [**Chemical reactions in sulphate pulping.**] *Holz Roh- u. Werkstoff* 11 (7), 1953 (251–7). 14 refs. [G.g.] P.R.

A brief outline of the history of the process is followed by an account of unsolved technical and theoretical problems in the constitution of sulphur lignins and the separation of carbohydrates, and of current research on these. Pulp yield and strength are also discussed.

2042. Mikawa, H., Sato, K., Takasaki, C., and Okada, H. [**Comparison of the groups of lignin which combine with sulphur in sulphite cooking and in kraft cooking.**] *Journal of the Chemical Society of Japan* (*Industrial Chemistry Section*), *Tokyo* 54, 1951 (299–300). [Jap.] From *Chem. Abstr.* 47 (6), 1953 (2981f–g). P.R.

Wood powder is subjected to sulphite cooking and then to kraft cooking or *vice versa*. The group that is sulphonated at pH 6 (Erdtman's A group) is not uniform and consists of 2 groups, X and Z. Sulphonation of X and Z at pH 6 is of first-order reaction. The X group combines also with S by digestion with H_2S water at pH 7. There seems to be another group Y which combines with H_2S under the same conditions but is not sulphonated at pH 6. The number of X group is 1 per molecular weight of lignin 1700–1800; Y, 7000–8000; Z, 1700–1800. The X group, which takes part in both processes, is supposed to be benzyl-alcohol OH group.

2043. Mikawa, H. [**The cooking of wood. I. Comparison of the groups of lignin which combine with sulphur in sulphite cooking and in kraft cooking.**] *Journal of the Chemical Society of Japan* (*Industrial Chemistry Section*), *Tokyo* 54, 1951 (651–3). [Jap.] From *Chem. Abstr.* 47 (14), 1953 (7211a–b). P.R.

The sulphonatable (at pH 6) and sulphidatable (at pH 7) groups of lignin of *Picea jezoensis* have been studied. They consists of 3 types of groups: X, Y, and Z. As the X group is not only sulphonatable but also sulphidatable, it is concluded that lignin contains a group which combines with S both in sulphite and kraft digestions.

2044. Mikawa, H. [**The cooking mechanism of wood. II. Kinetics of the sulphonation of wood with $NaHSO_3$. III. Nature of the groups of lignin which combine with sulphur in sulphite and kraft cooking processes.**] *Journal of the Chemical Society of Japan* (*Industrial Chemistry Section*), *Tokyo* 54 (11; 12), 1951 (741–3; 762–4). 10 refs. [Jap.] From *Chem. Abstr.* 47 (16), 1953 (8366b–d). P.R.

Spruce powder was subjected to cooking at 135° C. with $NaHSO_3 + Na_2SO_3$ (pH 6). The change in the amount of S in the resulting lignin sulphonate was studied kinetically. The sulphonation mechanism is considered to be the superposition of two first-order reactions. The behaviour of the groups X and Z observed in *Picea jezoensis* was also observed in *Pinus densiflora* wood.

2045. Celulózové a Papiernické Závody na Slovensku. Verfahren zum Aufschliessen von Holz und anderen zellulosehaltigen Rohstoffen mit Ammonbisulfitlösungen. [**Method of digesting wood and other cellulose-containing materials with solutions of NH_4HSO_3.**] *Austrian Patent* No. 175,785, Aug. 10, 1953. pp. 2. [G.] P.O.

2046. Martin, M. E., and Sherk, D. L. **Treatment of wood.** *Canadian Patent* No. 474,507, Dec. 7, 1951. pp. 4. P.O.

For the preparation of cellulose, wood is digested at least twice for 5–60 min. at 150–160° C. with an aqueous solution of a lower aliphatic acid (with or without H_3PO_4), the concentration of the acid in the second treatment being not greater than in the first.

2047. Levitin, N., and Schwartz, H. **Delignification of Spruce sawdust with chlorine dioxide.** *Prepr. U.S. For. Prod. Res. Soc.* No. 245, 1953. pp. 7. 23 refs. [Forest Products Laboratory, Ottawa.] P.R.

In laboratory-scale tests, using 20–27% ClO_2 in a multi-stage process, it was possible to obtain white pulps in 40–49% yield with α-cellulose values up to 87·5%. The purification and the evaluation of the pulps for acetylation are discussed.

2048. Björkqvist, K. J., Gustafsson, S., Jörgensen, L. **The removal of lignin and carbohydrates during bleaching of semichemical pulps.** *Svensk PappTidn.* 56 (19), 1953 (734–8). 11 refs. [E.e.sw.g.] [Billeruds AB, Säffle, Sweden.] P.R.

Fully bleached neutral sulphite pulps were obtained in yields of more than 60% from Birch and 55% from Spruce. Lignin and non-cellulosic hexosans were lost on bleaching. Pentosans and uronic acids were retained almost entirely in the bleached pulps; their importance to the papermaking properties of the pulps is discussed.

2049. BATE, S. C. **Purifying wood pulp.** *U.S. Patent* No. 2,645,576, July 14, 1953. pp. 6. P.O.

To obtain a cellulose suitable for esterification from a wood pulp containing more than 85% α-cellulose and less than 3·5% of pentosans, the pulp is treated with an aqueous alkali solution of concentration 17–19% and temperature 50–55° C. for 45–90 min., after which most of the alkali solution is removed, and the pulp washed free from alkali at a temperature above 80°.

2050. BATE, C. B., PEACH, F. G., and ROGERSON, W. A. **Purifying wood pulp.** *U.S. Patent* No. 2,645,577, July 14, 1953. pp. 8. P.O.

As the preceding patent, the treatment being completed by boiling the washed pulp with water for 15–45 min. at atmospheric pressure.

862. *Composite Materials made Wholly or Partly of Woody Matter*

See also Nos. 1957–9.

2051. WILSON, W. E. **Process for manufacturing composite board.** *U.S. Patent* No. 2,639,994, May 26, 1953. pp. 4. P.O.

The comminuted dried ligneous material is sprayed with a diluted HCl solution (the weight of the concentrated HCl being 0·5–2% of the weight of the material), the moisture content of the material is brought to 20–22%, and the mass then heated to 275–350° F. and subjected to pressure.

2052. SCHUMANN, A. Verfahren zur Herstellung von plattenförmigen Körpern. **[Method of producing plate-like bodies.]** *German Patent* No. 810,977, Aug. 16, 1951. pp. 2. [G.] P.O.

Absorbent fillers (woodwool, chips, sawdust, chaff etc.) are moistened, mixed with a dry binder (gypsum, cement, magnesite), and the mixture is subjected to pressure.

2053. EVENSEN, S. E. **Improvements in methods of moulding constructional plates from strips of fibrous materials and a binder.** *Brit. Patent* No. 684,153, Dec. 10, 1952. pp. 3 + 2 dgms. P.O.

Strips of fibrous material (e.g. wood wool) plus a bonding agent (e.g. hydrated cement), are pressed in a mould, first to the required thickness, by pressure applied at right angles to the largest lateral surfaces, and then, without further reduction in thickness, by pressure applied to one or two opposite, side edges of the board so formed, so that in the finished product, most strips will have their larger surfaces set substantially at right angles to the large surface of the finished product.

2054. IMAIZUMI, S. **[The effect of chip dimensions on the properties of hardened chipboard.]** *Wood Ind., Tokyo* 8 (9), 1953 (389, 402–5). 2 refs. [Jap.e.] P.R.

Physical and mechanical properties were tested for board made from chips of various sizes [illustrated] with a 10% resin content by weight pressed at 100° C. for 30 min. in all (10 min. at 40 kg., 10 min. at 5 kg., and 10 min. again at 40 kg./sq. cm.). The following results were obtained: (1) Swelling in water, water absorption, swelling in saturated steam and moisture absorption increased with decreasing chip dimensions and decreasing amounts of resin per unit area. (2) Compressive strength, Young's modulus, and modulus of rupture in bending decreased with decreasing dimensions. (3) Density and Brinell hardness increased with decreasing dimensions. (4) Chips ca. 3·0 mm. thick gave boards with the best deflection %. [Results are given in graphs and tables with English legends.] *From author's summary.*

2055. HOMANN, J. Verarbeitung von Stockholz in der Faserplattenindustrie. **[Stumpwood as raw material for fibreboard manufacture.]** *Holz-Zbl.* 79 (118), 1953 (1265). [G.]

Industrial experience has shown stumpwood to be a valuable raw material in the fibreboard industry, provided that the root portion is small and a mixture of species is used.

2056. CRAIG, S. G. **Measurement of dimensional stability of insulation board.** *Tappi* 36 (9), 1953 (166*A*–169*A*). P.R.

Compares the standard test for the determination of linear expansion (Federal Specifications and Commercial Standard LLL–F–321b–9) with a new test which is described, developed by an industrial laboratory.

2057. BASLER, H. Ursachen und Wirkungsweise der den Faserstoffen inhärenten Bindekraft in Rahmen der Hartplattenfabrikation. Der Versuch einer Deutung. **[Causes and nature of the bonding force inherent in fibrous materials in the manufacture of hardboards. A tentative explanation.]** *Holz Roh- u. Werkstoff* 11 (8), 1953 (297–302). 26 refs. [G.g.] P.R.

Analyses the similarities and differences between the processes in paper and cardboard manufacture and those in the manufacture of hard fibreboards. The closest analogy is found only in the disintegration and hydration stage. It seems that the prehydrolysis in the first stage of hardboard manufacture is partly a chemical process which ends in the final stage of the hydrothermic process. Pentosans are probably most instrumental in bonding, much more so than 'lignin'.

2058. GROVE, G. **New wood fibre—Tectum.** *Wood-Worker, Indianap.* 72 (8), 1953 (14–5, 32–4). P.R.

Describes a new fibreboard manufactured continuously using a non-specified binder; it is fire-resistant and can be machined.

2059. NOWAK, A. Verfahren zur Herstellung extraharter Formkörper, insbesondere Faserplatten. **[Method of manufacturing extra-hard moulded products, in particular fibreboards.]** *Austrian Patent* No. 170,640, March 10, 1952. pp. 3. [G.] P.O.

Extra-hard fibreboards are obtained by known after-treatment processes from boards made from specially prepared lignocellulosic masses.

2060. NOWAK, A. Verfahren zur Herstellung extraharter Formkörper, insbesondere Faserplatten. **[Method of manufacturing extra-hard moulded products, in particular fibreboards.]** *Austrian Patent* No. 170,811, March 25, 1952. pp. 2. [G.] P.O.

The fibreboards are manufactured from a specially prepared lignocellulosic material with addition of synthetic resins.

2061. SCHWARTZ, S. L. **Preparation of hardboard from White Oak.** *Tappi* 36 (10), 1953 (445–51). 8 refs. P.R.

To obtain White Oak hardboards of optimum flexural strength, ca. 0·75–1·0 % of size (rosin or paraffin [wax?]) was required. Very large amounts (ca. 6%) of affixing chemical (alum or $FeSO_4$) were required to set the size in hardboard stocks. Washing with hot water, to remove soluble tannins from the pulp, reduced the amount of chemicals from 6 to ca. 2%, with a simultaneous reduction in flexural strength of the hardboard obtained.

2062. WILCOX, H. **Interrelationships of temperature, pressure, and pressing time in the production of hardboard from Douglas-Fir fiber. The effect of these variables on hardboard properties.** *Tappi* 36 (2), 1953 (89–94). 3 refs. P.R.

Presents graphed results of studies on the hot pressing of hardboard from Douglas-Fir fibre in a Bauer mill. Temperature and pressure were found to affect the progressive temperature rise at the mid-thickness of the fibreboard mat, and the final density and modulus of rupture of the board. A direct correlation between strength increase and increase of pressing temperature from 340 to 460° F. was found in hardboards of equal density.

2063. DALLEY, O. T. **Factors influencing the drying of insulating board.** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 1952 (105–33). 12 refs. P.R.

The studies have shown that the drying of insulating board from the press-moisture stage is divided into 3 phases: (1) of limited duration, when the removal of water is influenced by temperature, humidity and air velocity, following which there is a sharp transition to (2) the major part of total drying time, when the drying is mainly affected by temperature, and the time of drying varies as the square of the thickness of the board; phase (3), roughly $\frac{1}{3}$ of the total time, removes the last 10–12% of the water in the board, with temperature again the controlling factor. *From author's summary.*

2064. **Imported hardboard. Is shipment loose the answer to the trade's foremost problem?** *Timb. Tr. J.* 207 (4032), 1953 (2143–4).

In a recent experiment, loose boards were shipped from Finland in piles of 1000 separated by dunnage wood, and unloaded, still in piles, by the Ahlstrom tongs made of hardened steel piping and incorporating short feet which are introduced beneath the pile of boards to be lifted. There is no danger of chafing, as contact with the boards is made only with the feet, which cause only slight indentation on the bottom (reverse) face of the lowest board. The method is claimed to reduce cost, save space on board and facilitate handling.

2065. KELLICUTT, K. Q., LANDT, E. F., and SETTERHOLM, V. C. **Basic design data for the use of fibreboard in shipping containers. Box strength calculator.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1911-*A*, 1952. pp. 9 + 1 photo + 4 dgms. + 2 tbls. 7 refs. P.R.

2066. BRAUN, G. Der schweizerische Holzspanbeton Durisol. **[The Swiss wood-chip concrete 'Durisol'.]** *Betonstein-Zeitung, Wiesbaden* 18 (5), 1952 (186–90). 2 refs. [G.g.e.f.] L.S.

Describes the material, its properties and application in building construction.

2067. CONRAD, F. Holzfaserbeton. **[Wood-fibre concrete.]** *Betonstein-Zeitung, Wiesbaden* 18 (9), 1952 (339–41). [G.g.e.f.] L.S.

General account of properties and use of wood concrete (Durisol type).

863. *Wood Hydrolysis. Saccharification*

See also Nos. 1779, 2073.

2068. KOBAYASHI, T. **Research on the kinetics of wood saccharification at lower temperatures with dilute and strong sulfuric acid.** *Bulletin, Forest Products Research Institute, Hokkaido* No. 3, 1952 (27–46 + 69 gphs., 5 tbls.). 18 refs. [E.] P.R.

Describes, tabulates and graphs results of recent research on the kinetics of the saccharification of cellulose and wood (sawdust of *Cryptomeria japonica*, *Pinus parviflora*, and Apitong [*Dipterocarpus* spp.]), using 51–81% H_2SO_4 at temperatures below 45° C. for the degradation of the cellulose molecule, and 1–62% H_2SO_4 at temperatures below 150° C. for the hydrolysis proper.

2069. GILBERT, N., HOBBS, I. A., and SANDBERG, W. D. **Utilization of wood by hydrolysis with dilute sulfuric acid.** *J. For. Prod. Res. Soc.* 2 (5), 1952 (43–9). 12 refs.

An economic evaluation is presented for a wood-hydrolysis process that was developed through pilot-plant work by TVA [Tennessee Valley Authority] and based on the Madison wood-sugar process. The production of wood molasses under present economic conditions would be favourable. The economics of wood hydrolysis is improved by use of wood waste instead of cordwood and by utilization of unevaporated solutions of wood sugars for production of yeast in an integrated plant. [Cf. *For. Abstr.* 14 (No. 1720).] *From authors' summary.*

2070. SAVARD, J., and ESPIL, L. La fabrication des levures alimentaires à partir des sucres de bois. **[The manufacture of fodder yeasts from wood sugars.]** *Bois For. Trop.* No. 29, 1953 (10–6). [F.e.span.]

Describes the continuous production of yeast at the factory at Morcenx and gives a method of calculating cost price/kg. of yeast.

2071. SCHMIDT, E. **Food and feed yeast in Germany.** *Unasylva* 7 (4), 1953 (152–4).

Gives a short account of the production of fodder yeast from hardwood-pulp waste liquor in Germany by the Waldhof continuous process, with figures on its nutritional value and uses as a poultry food and for fattening cattle.

864. *Utilization of Lignin*

2072. NORDENSKJOLD, T., and JONSSON, E. A. **A method of extracting lignin or oxidation products thereof from wood.** *Brit. Patent* No. 692,280, Jan. 8, 1953. pp. 3. P.O.

Wood (also wood waste) is treated with alkali, with or without oxidizing agents, after a preliminary

treatment with dry-rotting fungi or cellulose-fermenting bacteria.

2073. FLETCHER, T. L., and HARRIS, E. E. **Products from the destructive distillation of Douglas-Fir lignin.** *Tappi* 35 (12), 1952 (536–9). 5 refs. P.R.

When subjected for ca. 7·5 hours to pyrolysis at 400–445° C., the lignin obtained as residue in the hydrolysis of Douglas-Fir sawmill waste yielded 53–64·6% charcoal, 15–25% aqueous distillate, a settled tar and gases. Nine organic acids and 11 phenolic compounds were isolated from and identified in the settled tar and the dissolved tar removed from the distillate. The charcoal obtained can be used for briquetting or be activated. *From authors' summary.*

866. *Utilization of Wood Extractives*

See also Nos. 1783–92, 2093.

2074. KAZMI, M. A., and SIDDIQUI, I. A. **Possibilities of camphor production from *Cinnamomum camphora* in Pakistan.** *Pakistan J. For.* 3 (3), 1953 (142–5). 9 refs.

Gives results of an experiment in distilling camphor from *C. camphora* grown in Pakistan.

867. *Destructive Distillation*

See also Nos. 1794, 1910, 2073.

2075. SUGIURA, G., KISHIMOTO, S., and BABA, H. **[Studies on the effect in charcoal manufacture of a fence [a baffle in the form of a 33-cm. wall inside the front opening of the kiln].]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 62, 1953 (1–6). [Jap.jap.e.]

A new kiln with a brick baffle-wall is illustrated. Study showed that the use of such a baffle (1) raised the temperature at the bottom of the kiln from 770 to 830° C., (2) shortened the time needed to reach a temperature of 300° from 13¼ hr. to 8¼ hr., and (3) reduced the speed of air flowing through the kiln from 820 to 320 m./sec.

2076. COUQUET, L.-M. Four continu amovible, à carboniser le bois par distillation, avec possibilité de récupération sélectionnée des sous-produits. **[A stationary, continuous-operation retort for carbonizing wood by distillation, enabling the by-products to be selectively recovered.]** *French Patent* No. 979,526, April 27, 1951. pp. 5 + 11 dgms. [F.] P.O.

2077. KEDARE, B. S., and TENDOLKAR, G. S. **Destructive distillation of some hardwood species of Bombay state.** *J. sci. industr. Res., India* 12*B* (5), 1953 (217–21). 8 refs. D.S.I.R.

Tabulates results of tests on 46 species.

2078. TURNER, H. M. **Production and handling of coke in country [gas] works.** *National Gas Bulletin, Melbourne* 16 (3), 1952 (27–9). L.S.

A number of country works in Australia are using wood as an addition to coke in their producers. The main advantages are (1) increased production of coke for sale, (2) reduced clinker formation and less wear on the producer lining, and (3) help in keeping the fuel bed open when using coke from inferior coals. The only disadvantage is the damage that can be caused to the feed-hole and the surrounding brickwork of the producer, particularly when large wood blocks are dropped into producers with a curtain arch. Correct placing of the wood in the producer is essential for good quality of the producer gas. Dry wood gives better results than green.

2079. MASLENKOV, F. N. Piljno-koljnyĭ agregat dlja zagotovki gazogeneratornyh čurok. **[A combined sawing and cleaving machine for making wood-blocks for gas-producers.]** *Lesn. Prom.* 12 (11), 1952 (18–9). [Russ.]

Illustrated description of a machine equipped with 2 electric motors, one of which operates a twin circular saw, and the other a cleaver and conveyor band. The sawn disks are split by the cleaver which presses them against 3 stationary knives that cut them at right angles to the first split. Output is 16 cu.m. piled volume (= 8 cu.m. solid) per shift, using Birch logs of 24 cm. diam.

2080. **[Charcoal and other products of wood distillation.]** *Ninth Annual Report, East African Industrial Research Board, Nairobi, 1951*, 1952 (3–4). P.R.

Distillation of the Wattle industry's surplus wood in the Uasin Gishu district is being investigated on a pilot scale. It has been found to produce good-quality metallurgical charcoal which may be used locally for smelting. It can also provide alternative fuel for producer-gas vehicles. Charcoal has also been prepared from *Brachystegia* and *Isoberlinia* wood. The wood tar should be suitable for roads, for fuel oil, or be distilled to give wood creosote.

2081. MIYAKE, I., and SUGIURA, G. **[Charcoal from *Acacia* spp.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 63, 1953 (147–54). 12 refs. [Jap.jap.e.]

Results of tests on charcoal from *Acacia* spp., *Robinia pseudoacacia* and 2 varieties are given in tables [with English legends]. The properties of all, except *R. pseudoacacia* var. *umbraculifera*, as fuels are reasonably good though not equal to those of *Quercus serrata. From authors' summary.*

2082. FUKUYAMA, G., and SATONAKA, S. **[Properties of carbonized substances.]** *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (281–97). 20 refs. [Jap.jap.e.]

Studies were made on moisture content, ash content, density, sp. gr., C and H contents, I absorption, and structure under X-ray examination, of shirozumi charcoal, kurozumi charcoal, stove-charcoal, dry-distilled charcoal and hydrated active carbon. [Results are given in tables with English legends.] *From authors' summary.*

2083. FUKUYAMA, G., and SATONAKA, S. **[Properties of shirozumi charcoal, kurozumi charcoal and fuseyakizumi charcoal.]** *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (299–316). 15 refs. [Jap.jap.e.]

A detailed physical and chemical analysis [cf. preceding abstract] of these 3 well recognized grades (all from Oak).

2084. COCHEZ, J. Procédé de fabrication de carburants liquides à partir de la distillation du bois et appareillage pour sa mise en oeuvre. **[Method of producing liquid fuels [for internal combustion engines] from the products of the [destructive] distillation of wood, and the apparatus required.]**

French Patent No. 979,459, April 26, 1951. pp. 5 + 1 dgm. [F.] P.O.

2085. DUPLAN, F.-P.-E.-S. Procédé d'obtention d'hydrocarbures purs à partir de produits de pyrogénation et produits en résultant. [**Method of obtaining pure hydrocarbons from the products of pyrolysis, and the products thus obtained.**] *French Patent* No. 979,536, April 27, 1951. pp. 3. [F.] P.O.

89. OTHER ('MINOR') FOREST PRODUCTS

See also section 28.

892. *Vegetable Products*

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 1715, 1786–7, 1806.

2086. SMITH, J. E., and KURTH, E. F. **The chemical nature of Cedar barks.** *Tappi* 36 (2), 1953 (71–8). 15 refs. P.R.

Presents the results of an investigation on the barks of *Libocedrus decurrens*, *Chamaecyparis lawsoniana*, and *Thuja plicata*. The extractive content, distribution and physical properties were significantly similar in the barks of all 3 species. Bark towards the top of the tree contained, as a rule, more extractable material than lower samples; similar distribution was found in respect of tannins. The chemical nature of the hexane, benzene, and hot-water extractives was determined.

2087. KURTH, E. F. **Chemicals from Douglas-Fir bark.** *Tappi* 36 (7), 1953 (119*A*–122*A*). 10 refs. P.R.

Tannin, wax, dihydroquercetin and quercetin can be produced from Douglas Fir sawlog bark and the extracted bark residue can be used further for fuel or other purposes.

2088. KURTH, E. F. **Quercetin from Fir and Pine bark.** *Industr. Engng. Chem.* 45 (9), 1953 (2096–7). 9 refs. P.R.

Dihydroquercetin, present in the heartwood and bark of Douglas Fir and Jeffrey Pine, is converted to quercetin by treatment with hot aqueous bisulphite liquors; with $Ca(HSO_3)_2$ it produces a finely divided, insoluble Ca-quercetin complex.

2089. GORDON-GRAY, C. G. **A rapid method of determining the relative tannin content of young, living Black Wattle trees in genetical and breeding experiments.** *Rep. Wattle Res. Inst. S. Afr. 1952/53*, 1953 (42–8). 1 ref.

[Cf. *For. Abstr.* 12 (No. 2231).] The field sampling recommended is to take, with a No. 6 cork borer, single pellets of the bark at 1-ft. intervals over the basal 12 ft. of the tree. This sample is then extracted with cold water and the tannin content estimated spectrophotometrically. [Correlation coefficients are supplied.] *From author's summary.*

2090. PEARMAN, R. W. ***Parkia filicoidea* pods from Nigeria.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (231–2).

Though the leather-forming properties of the tannin extracts from *P. filicoidea* pod-cases are very promising, the liquor has the disadvantage of becoming slimy. The preparation of a solid extract is worth consideration.

2091. BENNETT, H., and PEARMAN, R. W. **Mopani bark from the Bechuanaland Protectorate.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (232–4).

The sample of *Copaifera mopane* bark tested was poor in tannin and gave a highly coloured infusion. The ratio of tannins to non-tannins in the bark was also low.

2092. BENNETT, H., and PEARMAN, R. W. **Spent Mangrove bark from North Borneo: the value of the ash as a fertiliser.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (234–5).

The sample analysed consisted of barks of *Ceriops tagal*, *Rhizophora mucronata* and *R. apiculata*. The ash was composed mainly of CaO (18%) and $CaCO_3$ (70%, measured as CO_2). This ash might be used as a lime manure, but the use of unburnt bark would be of little value.

2093. PEARMAN, R. W. **The Eucalypts as tanning materials.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (206–13). 19 refs.

Notes on the Eucalypts utilized as tanstuffs in various parts of the world (from both wild stands and plantations, bark and wood), and on the tanning properties and chemistry of Eucalypt extracts.

2094. KRASUHIN, M. N. Dubiljnyĭ èkstrakt iz kory èvkalipta. [**Tanning extract from Eucalypt bark.**] *Legkaja Promyšlennostj, Moskva* 12 (7), 1952 (20–1). [Russ.] P.R.

The bark of Russian-grown Eucalypts has been found to contain 1·5–20% tannins, the higher figures referring to species with exfoliating bark. Results are described and tabulated of experimental processing of 70 tons of Eucalypt bark in 1949–50. The average tannin content in samples varied from 9·5 to 12·48%, that of the non-tannins from 5·0 to 6·90%. To obtain a yield of 84·3% of tannin at temperatures below 100°, at least 8 diffusers are required and a large quantity of water. The addition of Na_2SO_3 to the water considerably increases the yield, exceeding even the analytically determined tannin content. The extract obtained (30–45%) has been found suitable for tanning sole leather when mixed with Oak extract; the Eucalypt bark extract can be used alone for Russian leather.

2095. KARPMAN, M. I., and ZOTOV, V. A. Kora krušiny kak dubiljnyĭ material. [**The bark of *Rhamnus* sp. as a tanning material.**] *Legkaja Promyšlennostj, Moskva* 10 (8), 1950 (31–2). [Russ.] L.S.

Cold alkaline (NaOH) extraction of the bark yields more tannins and less non-tannins than hot-water extraction. When sulphitized, the insolubles are transformed into tannins.

2096. BRIGGS, L. H., JACOMBS, F. E., and NICHOLLS, G. A. **The colouring matter of the bark of *Rhamnus alaternus* L.** *J. chem. Soc.* Oct., 1953 (3069–72). [Auckland University College, Auckland, New Zealand.] O.R.S.

Emochin and a new tetrahydroxymethylanthraquinone, probably the 3 : 4 : 5 : 7-tetrahydroxy-2-methyl compound, have been isolated from the

hydrolysed extract of the bark. *From authors' summary.*

2097. Tsujimoto, M. **Chemical components of the leaves of *Acer aizuense*.** *Nat. Sci. Rept. Ochanomizu Univ., Tokyo* 2, 1951 (138–41). From *Chem. Abstr.* 47 (11), 1953 (5498e). P.R.

Paper-chromatographic analysis of crude tannin obtained from air-dried leaves of *A. aizuense* revealed a tannin and gallic acid, while mother liquor of the crude tannin was found to contain quercetin acetate.

2098. Inal, S. Hē balanidia en Helladi kai Tourkia kai hē oikonomikē semasia autēs. [***Quercus aegilops* in Greece and Turkey and its economic importance.**] *Dasos* No. 20, 1952 (61–6). [Gk.gk.f.]

Gives some data on distribution and area of stands, production of acorns, and financial return from the crop.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

See also No. 1715.

2099. Watt, J. M. ***Ginkgo biloba* L.** *Trees S. Afr.* 5 (2), 1953 (9–12). 26 refs.

A general descriptive article including analysis of nuts and ca. 15 chemical or pharmacological references.

2100. Stanković, S. Č., Karapandžić, Đ., and Senić, R. Uticaj lagerovanja na kvantitativne promene eteričnog ulja, β-karotina i hlorofila u četinama crnog bora (*Pinus nigra* Arn.). [**Effect of storage on quantitative changes in the essential oil, β-carotene, and chlorophyll, in *P. nigra* needles.**] *Glasn. šum. Fak., Beograd* No. 6, 1953 (237–48). 33 refs. [Serb.serb.e.]

The effect is discussed of storage in the open and in a closed space on (1) the moisture content, (2) quantity of essential oil, β-carotene and chlorophyll, of *P. nigra* needles. Storage in a closed space beyond 40 days affects the stored material unfavourably.

2101. Auxence, E. G. **A pharmacognostic study of *Piscidia erythrina*.** *Econ. Bot.* 7 (3), 1953 (270–84). 34 refs.

Reviews literature on the use of bark and wood of the root and stem in pharmacy and presents an anatomical and chemical study of the stem bark and wood with a description of the macroscopic and microscopic characteristics of the leaves.

2102. Humphreys, F. R. **Rutin in the leaves of *Eucalyptus delegatensis*.** *Aust. J. Sci.* 16 (1), 1953 (30). 4 refs. [Division of Wood Technology, Forestry Commission of N.S.W.] O.B.D.

Quantities of 3–4% rutin were found in *E. delegatensis* leaves. Negative results were obtained with *E. wilkinsoniana, E. tindalae, E. robertsoni. E. botryoides, E. micrantha, E. yangoura, Melaleuca linariifolia, M. stypheliodes, M. alternifolia, Acacia glaucescens, Syncarpia laurifolia* and *Jacksonia scoparia.*

2103. Djerassi, C., Gorman, M., Nussbaum, A. L., and Reynoso, J. **Alkaloid studies. II. Isolation of reserpine and narcotine from *Rauwolfia heterophylla* Roem. and Schult.** *J. Amer. chem. Soc.* 75 (21), 1953 (5446–7). 11 refs. [Wayne University, Detroit I, Michigan.] O.R.S.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 1381–7, 1715, 2096.

2104. Kuraoka, Y. [**Studies of the supply of and demand for resin.**] *For.* [*industr.*] *Econ., Tokyo* 6 (10), 1953 (20–33). 8 refs. [Jap.jap.]

Outlines the history of the industry in Japan, its development, and domestic and foreign consumption, with numerous tables and graphs.

2105. Šolaja, B. Fizičke i hemiske osobine balzama i kolofonijuma borova *Pinus nigra* Arn. i *Pinus sylvestris* L. sa ličkog Krša. [**Physical and chemical features of the oleoresin and rosin of *P. nigra* and *P. sylvestris* from the Karst of Lika.**] *Glasn. šum. Fak., Beograd* No. 6, 1953 (197–235). 12 refs. [Serb.f.]

The acid value of the turpentine fraction of resin from *P. nigra* (1) varies from 106·5–116·8 (open face i.e. American or French) to 99·6 (bore-hole method); the respective figures for *P. sylvestris* (2) are 115·0–142·5, and 90·3. The rosin from (1) has an acid value of 150·4–158·5 and density of 1·063–1·071, French faces yielding the highest value. The figures for (2) are 165·4–173·3 and 1·073–1·075 respectively. Other properties (rotatory power, softening point, non-saponifiable substances etc.) show more or less significant differences between the two species and the two tapping methods.

2106. Corbett, R. E., and Hanger, W. G. **The volatile oil of *Metrosideros umbellata*.** *J. Sci. Food Agric.* 4 (11), 1953 (508–11). 15 refs. [University of Otago, Dunedin, New Zealand.] O.R.S.

The essential oil of the leaves and terminal branches has been fractionated and shown to contain at least 12 constituents, 9 of which have been identified with known compounds.

2107. Nair, G. V., Poti, A. N., and Pillay, P. P. **The constituents of lacquer-bearing trees of Travancore-Cochin: Part III—industrial utilization of lacquering agents of *Holygarna arnottiana* Hook. and *Semecarpus travancorica* Bedd.** *J. sci. industr. Res., India* 12*B* (2), 1953 (46–8). 4 refs. D.S.I.R.

Laccol from the 2 species has been processed into non-vesicant resins, the possible use of which in the manufacture of varnishes, lacquers, enamels etc., is indicated.

2108. Raymond, W. D., and Squires, J. A. **Candlenut [*Aleurites moluccana*] oil from Malaya.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (229–30). 1 ref.

Although the iodine value of the Malayan oil was rather lower than previous samples, it dried satisfactorily. The residual cake after extraction of candlenut oil is toxic and cannot be used as cattle food.

2109. Cole, L. N., and Craig, B. M. **The fatty acid composition of Caragana seed oil.** *Canad. J. Technol.* 31 (9), 1953 (196–201). 10 refs. P.R.

2110. Raymond, W. D., Squires, J. A., and Ward, J. B. ***Licania venosa* seeds from British Guiana.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (227–8).

The seeds have a low oil content, but the properties of the oil are similar to those of oiticica oil.

2111. Coomes, T. J., and Islip, H. T. **Gum arabic from Somaliland Protectorate.** *Colon. Plant Anim. Prod.* 3 (3), 1953 (242–8).

The samples analysed were all from the small-leaved Somaliland form of *Acacia senegal*. The importance of careful methods of collection is stressed.

2112. Anderson, E., and Blake, B. B. **The composition of Honey Locust gum.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 42 (11), 1953 (662–4). 11 refs. [University of Arizona.] O.R.S.

Results of analyses of the gum, a pathological product found only on injured or diseased trees, are tabulated.

2113. Cvrkal, H. Průmyslové zpracování semen gledičie. **[Industrial processing of *Gleditsia* seeds.]** *Lesn. Práce* 31 (8), 1953 (355–9). [Cz.]

Describes a process developed in Czechoslovakia to obtain a tragacanth substitute. The seed coat and germ are removed by steaming, roasting and sifting, after which the endosperm is ground to meal, yielding a highly viscous aqueous 'solution'.

2114. Comollo, A. J., and Kiang, A. K. **Dambonitol: its isolation from [latex of] *Dyera lowii* and *Dyera costulata* and its constitution.** *J. chem. Soc.* Oct., 1953 (3319–21). [Malayan Guttas Ltd., Singapore.] O.R.S.

892.7. Fruits, Seeds. Fibres, Yarns and Flosses

See also Nos. 1715, 2090, 2108–10, 2113.

2115. Maymone, B., and Battaglini, A. Ricerche sulla digeribilità e sul valore nutritivo dei semi di carrubo (*Ceratonia siliqua* L.). **[Studies of the digestibility and nutrient value of Carob (*C. siliqua*) seeds.]** *Ann. Sper. agr.* (*n.s.*) 7 (4), 1953 (1367–75). 5 refs. [It.it.e.] C.G.B.

Cf. *For. Abstr.* 13 (No. 1740).

2116. Tobler, F. La fibra de palma española. **[Fibre of *Chamaerops humilis*.]** *Euclides, Madrid* 11 (121), 1951 (116–7 + 2 photos). [Sp.] L.S.

Describes this dwarf Palm, its distribution, and significance as a source of valuable fibre. [Cf. *For. Abstr.* 8 (No. 1357).]

892.8. Heather. Broom etc. Osiers. Canes and Bamboos. Reeds and Rushes. Thatching Materials

See also No. 2028.

2117. McClure, F. A. **Bamboo as a building material.** Foreign Agricultural Service, U.S. Department of Agriculture, Washington. 1953. pp. 52. 59 refs.

Includes sections on Bamboo reinforcement of concrete, preservation, tool requirements, and notes on 55 species.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

2118. **Report of the Minister for Lands on Forestry for the period from 1st April, 1943, to 31st March, 1950.** Stationery Office, Dublin. P. No. 1495, 1953. pp. 58 + 5 photos + 1 map. [E.] Price 3*s*.

902. *History of Forests and Forestry*

See also Nos. 1201–2, 1212, 1257, 1323, 1854, 2160, 2175.

2119. ERNST, F. Aus der Waldgeschichte der schlechtwüchsigen Kieferngebiete der Bayer. Oberpfalz (und Oberfrankens) vom ausgehender Mittelalter bis zum Dreissigjährigen Krieg. [**The forest history of poor-growth Pine sites in the Bavarian Upper Palatinate (and Upper Franconia) from towards the end of the Middle Ages to the Thirty Years War.**] *Mitt. StForstverw. Bayerns* No. 26, 1951 (11–66). [G.]

Climatic factors and the nutrient status of the soil are favourable here for good growth of Scots Pine. Pollen analysis indicates original widespread Pine with an admixture of Beech and Oak. Old records show that the present poor condition of the stands is due to abuse—the excessive demands for iron-smelting (15th to 16th centuries) and for domestic use, plus the more permanent damage caused by open-cast ore mining and charcoal burning, including the removal of stumps, turves, litter etc. When dwindling fuel supplies hit the industry, depopulation followed and fields reverted to forest. From the earliest times even worse damage was done to the forest soil through the system of land tenure and utilization. The skill of the 16th-century foresters was adequate but they left no school, and those appointed at the counter-reformation were often foreign placemen having little field knowledge of forestry; this did not revive again until the 19th century. [Cf. *For. Abstr.* 15 (Nos. 1342–6).]

2120. BOUDY, M. C. La résurrection de la forêt marocaine. Le rôle du Maréchal Lyautey. [**The resurrection of the forests of Morocco. The work of Marshal Lyautey.**] *Rev. int. Bot. appl. Agric. trop.* 33 (371/372), 1953 (376–88). [F.] P.R.

An account of forest development since 1913.

2121. NANO, J. F. **Brief history of forestry in the Philippines.** *Philipp. J. For.* 8 (1/4), 1953 (9–127).

903. *Forest Policy, General*

2122. **National forest policies in Europe.** *FAO For. & For. Prod. Stud.* No. 8, 1953. pp. 370. Price U.S. $3·00 or 15*s*.

Contains reports on national forest policy and brief answers to a questionnaire on afforestation and reforestation, supplied by the governments of Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Ireland, Israel, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and Jugoslavia.

2123. FOURY, P. Politique forestière au Sénégal. [**Forest policy in Senegal.**] *Bois For. Trop.* No. 30, 1953 (8–21). [F.e.span.]

2124. **Legislative Council of Tanganyika Sessional Paper No. 1. Forest policy.** Government Printer, Dar-es-Salaam. 1953. pp. 5. Price 50 cents.

2125. **Forest policy in South Africa: a report to FAO by the government of the Union of South Africa.** *Unasylva* 7 (4), 1953 (161–5).

2126. HUTTON, M., and WINKELMANN, H. G. Informe sobre forestación y desarrollo forestal en el Uruguay. [**Afforestation and forest development in Uruguay.**] *Silvicultura, Uruguay* 3 (3), 1953 (7–47). [Span.e.]

A report prepared by the FAO mission to Uruguay, additional to the main 1951 report and dealing in particular with the development of the Uruguayan forests. The following points are discussed: the aims of afforestation; guiding principles, preliminary requirements for implementing a successful forest policy, state aid and direction, supervision of private forests, state forests, forest management and 'timber production'. The draft of a proposed forest law is appended.

904. *General Regional Accounts of Forests and Forestry*

See also Nos. 1667, 1688.

2127. **Britain's forests: Drumtochty.** Forestry Commission, London. 1953. pp. 22. Price 1*s*. 3*d*.

2128. **Britain's forests: Glentress.** Forestry Commission, London. 1953. pp. 20. Price 1*s*.

2129. GUINIER, P. Ce que des francs comtois ont pu apprendre en Béarn et en Bigorre. [**What Franche Comté can learn from Béarn and Bigorre.**] *Bull. Soc. for. Franche-Comté* 26 (11), 1953 (598–612). [F.]

An account of forests and forestry in the departments of Basses and Hautes Pyrénées, based on a tour by the Société forestière de Franche-Comté.

2130. HIAS, G. Les forêts des Basses-Pyrénées. [**The forests of the Basses-Pyrénées.**] *Bull. Soc. for. Franche-Comté* 26 (11), 1953 (581–92). [F.]

2131. LAITAKARI, E. Finnische Waldwirtschaft der Gegenwart. [**Finnish forestry at the present time.**] *Schweiz. Z. Forstw.* 104 (6; 10; 11/12), 1953 (223–30; 491–9; 612–8). [G.f.]

2132. FIRAT, F. Ai oikonomikai sunthēkai tōn dasōn tēs Tourkias. [**The economic condition of Turkish forests.**] *Dasos* No. 20, 1952 (52–60). [Gk.gk.f.]

2133. KARSCHON, R. **Forestry in Israel.** *Unasylva* 7 (4), 1953 (165–7).

2134. CAMERON, D. R. [**Some impressions of forestry in Israel.**] *La-Yaaran* 3 (2/3), 1953 (54–5, 80). [Heb.e.]

2135. **Preliminary report by Bureau of Forestry, Ministry of Agriculture and Forestry, Republic of Korea.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 31, [1952]. pp. 13. Limited distribution: FAO, Rome.

Gives, in some detail, a general account of: administration—forest ownership, organization, finance; silviculture, erosion control, management, protection (for both public and private forests); utilization, with outturn of fuel and minor forest produce from 1947 to 1950; marketing, with trends; labour; education and propaganda; and research.

2136. **An outline of Hokkaido forestry.** Forest Products Research Institute, Hokkaido, Japan. 1952. pp. 34 + 31 photos, 2 maps. [E.] P.R.

2137. **Progress report: [forestry in] Thailand.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 33, [1952?]. pp. 21. Limited distribution: FAO, Rome.

2138. LETOURNEUX, C. La situation forestière du Siam. **[The forest situation in Siam.]** *Bois For. Trop.* No. 26, 1952 (370–80). [F.e.span.]

2139. ROLLET, B. Note sur les forêts claires du sud de l'Indochine. **[Note on the open forests of the south of Indo-China.]** *Bois For. Trop.* No. 31, 1953 (3–13). [F.e.span.]

2140. REUN, H. C., and HUET, J. **Summary of report on results and progress of forestry in Cambodia.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 38, [1952]. pp. 6. Limited distribution: FAO, Rome.

Of a total land area of 176,000 sq. km., ca. 100,000 sq. km. are forest. The forests of Cambodia consist of (1) inundated forest (Mangrove swamps, forest round the Great Lake and riverain forests), (2) mountain forests, and (3) non-inundated low-altitude forest. Of these, (3) is by far the most important and includes one million ha. of tropical rain forest, and 2 million ha. of monsoon forest. There is also some 5 million ha. of degraded, open forest, the result of fire, shifting cultivation etc., which is subject to frequent fires and laterization. Annual production of sawlogs is ca. 225,000 cu.m., and of firewood more than 400,000 steres. All forests are officially administered by the Forest Service.

2141. **Summary of report on the forests and forest service of Vietnam.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 39, [1952]. pp. 5. Limited distribution: FAO, Rome.

Of a total land area of 32·8 million ha., about 40% or 13·5 million ha. are under forest. About $\frac{1}{6}$ is Crown forest and the rest state forest. There are 3 regional forest services (North, Central, and South Vietnam) and 2 additional services for the Crown forests (called Services for the Hill Population). Notes are given on the organization of divisions etc. Production of sawtimber in 1951 was 171,344 cu.m., and of firewood 452,389 steres. Small quantities of both categories were also imported from Cambodia. A 5-year plan of management is being prepared by the forest services.

2142. **Report on the activities 1950–51 of the forest service of the Kingdom of Laos: Summary.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 32, [1952]. pp. 2. Limited distribution: FAO, Rome.

Summary in English of a report originally written in French. There are no private forests in Laos, but 14 million ha. of state forest and over half a million ha. of Crown forest. The forest service has a staff of 10 divisional forest officers, 16 district officers and 44 rangers. Owing to shortage of staff, civil administration officers are in charge of many forests. Shifting cultivation is generally practised. Timber production in 1951 was 43,700 cu.m.—not enough to satisfy local demands.

2143. THOMPSON, T. S. **The territory of Western Samoa.** *Emp. For. Rev.* 32 (4), 1953 (309–15 + 8 photos).

A brief review of geography, geology, topography, climate, soils, vegetation, forestry and land use.

2144. MCGRATH, K., GACHOT, R., and GALLANT, N. M. **The Amazon valley: some impressions recorded by the FAO Forestry Mission.** *Unasylva* 7 (3), 1953 (98–104).

2145. Aspectos fundamentales de las actividades forestales y madereras de Chile. **[Some fundamentals of forestry and the timber trade in Chile.]** *Chile Maderero* 3 (9), 1953 (1, 3, 5). [Span.]

Discusses (1) the present state of the Chilean forests, (2) destruction caused by fires, (3) the need for encouraging natural regeneration, (4) markets and exports, (5) timber in the Chilean building and packing-case industries, (6) problems connected with the utilization of species in the mixed Chilean forest, (7) the high % of low-grade timber produced, and (8) confusion in applying existing timber standards.

905. *Forest Statistics and Resources*

See also Nos. 1689, 1692.

2146. **Census of Woodlands 1947–49. Woods of five acres and over: English county details.** *Census Rep. For. Comm., Lond.* No. 5, 1953. pp. 270. Price 12*s.* 6*d.*

Supplementary to Report No. 1. [Cf. *For. Abstr.* 14 (No. 4022).]

2147. MCNEILL, W. M. **British forests. Their potentialities in relation to the chemical utilization of wood, with special reference to forestry in Scotland.** *Chem. & Ind.* 1952 (45), (1087–9). 6 refs. P.R.

A brief outline of the history of forestry and forests in Britain and their present and future economic potential, with particular reference to pit-prop and pulp supply and the best use of the smallest produce from cleanings etc.

2148. LEROY, R. L'emploi des statistiques forestières dans les monographies. **[The use of forest statistics in [geographical] monographs.]** *Rev. Géogr. alp.* 41 (4), 1953 (629–66). [F.f.] O.G.

Discusses the reliability and usefulness of French official statistics on forest area, composition and financial yield, illustrated by data for an area in the Hautes Pyrénées; and makes recommendations for the safest way to use them when no others are available.

2149. KROG, P. Totalregnskapet for skogbruket. **[Statement of accounts for forestry in the whole of**

Norway.] *Tidsskr. Skogbr.* 61 (7/8), 1953 (310–7). [Nor.]

Gives tabulated data with notes showing, for the period before and after the war, expenditure and receipts, capital, production of timber and its distribution among different industries, and comparative figures for production in forestry, agriculture, fishing, industries and other activities.

2150. Oversigt over de danske Statsskoves udbytte af ved og penge for finansåret 1951–52. **[Review of the timber and financial yields of the Danish State Forests for the financial year 1951–52.]** Nielsen & Lydiche (M. Simmelkiær), Copenhagen. 1953. pp. 16 + 1 tbl. [Dan.]

2151. **[Swiss forest statistics for 1951.]** *Schweiz. Forststatist.* 13 (2), [1953?]. pp. 42. [G.F.]

2152. Grujić, Ž. Obnova šuma u NR Srbiji od 1945 do 1951 godine. **[Forest regeneration in Serbia from 1945 to 1951.]** *Šumarstvo* 6 (5), 1953 (407–18). [Serb.e.g.]

Tabulates the forest areas regenerated (afforestation of old felling sites, regular felling sites, beating up, tending etc.) in Serbia and in other federated Jugoslav republics for every year between 1945 and 1951.

2153. Hutchison, O. K., and Winters, R. K. **Kentucky's forest resources and industries.** *For. Resour. Rep. U.S. For. Serv.* No. 7, 1953. pp. 56. 8 refs. Price $0·35.

2154. Soepardi, R. Objek exploitasi hutan Kota Waringin. **[The forests of Kota Waringin [Borneo] and their exploitation.]** *Rimba Indonesia* 2 (5), 1953 (183–200 + 1 map). [Jav.e.]

No survey of the area has been carried out, but data on felling by the inhabitants along the edge of the forests, exports, and royalties indicate the presence of valuable resources. Figures of exports, royalties and costs are given, and future regulation and management of the area are discussed. *From author's summary.*

907. *Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)*

See also Nos. 1034, 1055 *et seq.*

2155. Tansley, Sir A. **The conservation of British vegetation and species.** In *the Changing Flora of Britain*, Botanical Societyof the British Isles, c/o Department of Botany, The University, Oxford. 1953. pp. 188–96. O.B.D.

Mainly an account of the work and organization of the Nature Conservancy.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 1031–2, 1257, 1320 *et seq.*, 2120, 2122, 2126.

2156. Velay, L. Le plan de reboisement français. **[The French plan for reforestation.]** *Rev. int. Bois* 20 (184), 1953 (177–80). [F.]

An account of the official plan for restoring derelict forests, converting unprofitable coppice to high forest, and planting abandoned agricultural land, with the advice and supervision of the Administration des Eaux et Forêts and with subsidies or credits from the Fonds Forestier National.

2157. Miklavžič, J. Ureditev paše je temelj obnove razdejanih ali močno ogroženih gorskih gozdov. **[Pasture management is the basis for rehabilitating the ruined or seriously threatened mountain forests.]** *Gozd. Vestn.* 11 (6/7), 1953 (161–74). 11 refs. [Sloven.sloven.]

A general account of the mountain pastures problem. Includes a regulation scheme embracing the delimitation of pastures and forests, and pasture management.

2158. Chapman, G. W. **Wood supply and consumption in Cyprus in relation to afforestation policy.** *Tech. Pamphl. For. Dep. Cyprus* No. 10, 1952. pp. 15.

2159. Cardew, J. Aufforstungsprojekte in China. **[Afforestation plans in China.]** *Wirtschaftsdienst* 33 (2), 1953 (109–11). From *abstr.* in *Z. Weltforstwirt.* 16 (4), 1953 (147–8). [G.]

Discusses the plans for establishing shelterbelts and afforesting desert, mountain and catchment areas over a 30-year period and reports progress so far.

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

See also No. 2163.

2160. Hase, W. Waldeigentum und Forstaufsicht in Schleswig-Holstein. **[Forest ownership and public supervision of forestry in Schleswig-Holstein.]** *Mitt. Bundesanst. Forst- u. Holzw.* No. 31, 1953. pp. 114 + [2]. 79 refs. [G.g.]

A historical study of ownership conditions, deforestation and forest conservation, from the Middle Ages up to the forest conservation law of May 1950.

2161. Maselli, V. Le foreste demaniali in Liguria e la loro importanza nell'economia regionale del paese. **[The state forests in Liguria and their importance in the regional economy of the country.]** *Monti e Boschi* 4 (9), 1953 (416–23). [It.f.e.]

2162. Mason, D. T. **Changing economic conditions and forest practices on privately owned lands [in the U.S.A.].** *J. For.* 51 (11), 1953 (803–8).

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

See also Nos. 1027, 2126, 2160.

2163. M[usset], O. [de] G[randcourt de]. Le statut de la forêt privée au début du XXe siècle. **[The regulation of private forestry [in France] at the beginning of the 20th century.]** *Bull. Soc. for. Franche-Comté* 26 (11), 1953 (613–20). [F.]

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

See also No. 2156.

944. *Co-operation. Collaboration of Forest Owners*

See No. 1283.

945.2. *Publicity, Propaganda*

2164. CARLSON, F. E. **Television and forestry.** *J. For.* 51 (10), 1953 (715–9). 11 refs.

Television is used in U.S. forestry by forest schools, State departments and divisions of information and education, and in reply to 146 questionnaires 91 of these bodies expected to use more of it. In 10 years the number of TV stations is expected to equal or exceed the present number (ca. 1773) of daily newspapers and already the number of films shown on TV exceeds that shown by the cinema industry. Main features of a programme are outlined.

945.3. *Education. Training*

See also Nos. 1027, 1701.

2165. **Directory of Forestry Schools.** *FAO For. & For. Prod. Stud.* No. 10, 1953. pp. 299. Price $3·00 or 15*s*.

Arranged by countries, under continents, and gives approximate cost of living, fees etc. as well as curricula, for schools of university standard.

945.4. *Research*

See also Nos. 1027, 1236, 1506, 1702.

2166. Arbeitsbericht für den Zeitraum vom 1.10.1951 bis 31.3.1953. **[Report on work for the period 1.10.1951–31.3.1953.]** Bundesanstalt für Forst- und Holzwirtschaft, Reinbek bei Hamburg. [1953.] pp. 38. [G.]

2167. KISSER, J. **Austrian wood research Institute, Vienna.** *Nature, Lond.* 172 (4390), 1953 (1120–1).

A short account of the Institute, which was opened 22 Oct. 1953. [Cf. *For. Abstr.* 14 (p. 123).]

2168. NÄSLUND, M. Statens skogsforskningsinstitut, dess arbetsuppgifter och organisation. **[The Swedish Forest Research Institute, its work and organization.]** *Medd. SkogsforsknInst., Stockh.* 42 (3*A*), 1953. pp. 23. [Sw.] English and German versions of this paper are published as *Medd. SkogsforsknInst., Stockh.* 42 (3*B* and 3*C*). Price *Kr.*1 each.

2169. NIČOTA, B. Šumarski Naučno Opiten Institut vo godina 1944–51. **[The Macedonian Forest Research Institute, 1944–51.]** *Godišn. šum. nauč. opit. Inst., Skopje* 1, 1951 (3–8). [Maced.f.]

The organization of the Institute, founded in 1944, is described. The scientific staff has 7 members, plus 3 assistants. The main sections are: plant sociology; pedology, shelterbelts and soil erosion; and seed research.

2170. GRIFFITH, A. L. **Forest research in East Africa.** *Unasylva* 7 (4), 1953 (168–9).

2171. Recherche agronomique de Madagascar No. 1. Compte rendu 1952. **[Agricultural research in Madagascar. No. 1. Report for 1952.]** Inspection Générale des Services Agricoles, Paris. [1953.] pp. 104. [F.]

Includes (1) a general account of the organization of research and (2) measures for erosion control, in Madagascar.

2172. **Annual report on active forest research projects [in Canada] for the year ended March 31, 1953.** Forestry Branch, Ottawa. Parts 1–3, 1953. pp. 112 + 94 + 91.

Vol. 1 covers head office and Ontario Forest District, Vol. 2 Maritimes, Quebec and Newfoundland Forest Districts, and Vol. 3, Manitoba, Saskatchewan and Alberta Forest Districts.

2173. WEBB, L. S. **Forestry research by a Canadian pulp and paper company.** *Pulp Paper Mag. Can.* 54 (12), 1953 (174 . . . 177). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1331 (*F*–1).)

A brief account of the work of the Causapscal Forest Research Station of the Canadian International Paper Company in western Gaspé, Quebec.

2174. **The Agricultural Research Center of the United States Department of Agriculture [at Beltsville, Maryland].** *Agric. Handb. U.S. Dep. Agric.* No. 43, 1952. pp. 48.

Gives a brief account of the fundamental research done at the centre, including that on forestry.

946.2. *Conferences and Excursions*

See also No. 1190.

2175. Vorträge der Hochschulwoche Hann. Münden 1951. **[Lectures delivered at the Hann. Münden Hochschulwoche, 1951.]** *SchrReihe forstl. Fak. Univ. Göttingen* No. 2, 1952. pp. 78. [G.]

Gives the substance of the following lectures, among others, delivered during the conference: Recent results of forest work studies (*H. Gläser*); Ecology, site factors and silviculture, with examples from the mountains of central Germany (*F. K. Hartmann*); Notes on the forest history of the central and west-German Beech region (*K. Mantel*); Utilization and grading of Beech stemwood (*H. Mayer-Wegelin*); New principles in the control of *Peridermium pini* (*D. Mülder*); Raising the outturn of German forests—ways and prospects (*A. Olberg*); Some possibilities of tree breeding (*T. Schmucker*); Planning and execution in forest management (*R. Schober*); Recent advances in the knowledge of soil minerals (*H. Schumann*); Experiments on the effect of various lime fertilizers on raw-humus decomposition (*R. Themlitz*); Natural enemies of large-scale forest pests (*A. Frhr. von Vietinghoff-Riesch*); Some results of site-mapping in the mountains of central Germany (*E. Volkert*); Principles of

soil improvement by means of intermediate agricultural use (*W. Wittich*); Beech bark disease, its cause and prognosis (*H. Zycha*).

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses. Conferences*

See also Nos. 1118, 1379, 1766.

2176. **Report on the Eucalyptus study tour held in Australia September/October, 1952.** FAO, Rome. FAO 52/11/7505, 1952. pp. 7.

Cf. *For. Abstr.* 15 (No. 1263).

972. *Organizations*

2177. MÖRATH, E. Internationale wissenschaftliche Zusammenarbeit auf dem Gebiet der Forst- und Holzwirtschaft. **[International scientific co-operation in the field of forestry and forest products.]** *Holz Roh- u. Werkstoff* 11 (3), 1953 (85–91). [G.g.] P.R.

Outlines the history and present condition of international co-operation in forestry research, forest products research, including research on the economic aspects of forestry, and in documentation. The activities and organization of FAO are discussed in some detail.

References: 1. *CPPA News Bulletin*, Montreal; 2. *FAO Publication*, Rome; 3. *Fire Control Notes*, Washington; 4. *Forestry Commission Leaflet*, London; 5. *Holz als Roh- und Werkstoff*, Berlin; 6. *India News*, London; 7. *Journal of Forestry*, Washington; 8. *Nigeria Trade Journal*, Lagos; 9. *NRC Research News*, Ottawa; 10. *Pulp and Paper Magazine of Canada*, Gardenvale, P.Q.; 11. *Science*, Lancaster, Pa.; 12. *Southern Lumberman*, Nashville, Tenn.; 13. *Tidsskrift for Skogbruk*, Oslo; 14. *Timber of Canada*, Ottawa; 15. *Timber Trades Journal*, London; 16. *Times*, London; 17. *Unasylva*, Rome.

International.

FAO. At the 7th Session of the FAO Conference it was decided that the Regional Office for Asia and the Far East should remain permanently at Bangkok. It was recommended that a forestry training centre should be established in the Near East (**2**; Jan. 1954).

The 3rd FAO Conference on Mechanical Wood Technology will be held at the Chambre de Commerce Internationale, Paris, from 17 to 24 May 1954. Subjects on the agenda include: testing methods for timber, fibreboards, veneer, plywood and chipboard; structural grading of timber; testing of fire resistance; advances and developments in sawing and machining techniques; progress in producing new building materials based on wood; and promotion of international exchange of ideas and information among research workers (**4**; 4.2.54).

The first international conference to discuss avalanche control will be held in Switzerland in the summer of 1954 under the aegis of FAO. The conference will be held by members of a working party on torrent and avalanche control set up in 1951 by the European Forestry Commission of FAO (**2**; Jan. 1954).

The following conferences have also been arranged for 1954:

March.	Switzerland.	Pilot Committee on Logging.
April.	Rome.	Forest Grazing Panel.
„	Damascus.	Regional Poplar Conference for the Near East.
„	Rome.	Permanent Committee of the International Poplar Commission.
June.	Greece.	Sub-Commission on Mediterranean Forestry Problems.
„	Heidelberg.	Technical Panel on Wood Chemistry.
Sept.	Nancy.	Permanent Committee of I.U.F.R.O. and Joint Bibliographical Committee.
29 Sept.–11 Oct.	Argentina.	Latin American Pulp and Paper Meeting.
Oct. [?]	Tokyo [?].	Asia-Pacific Forestry Conference.

Other bodies: The following conferences have been arranged:

12–17 April 1954. Algiers. International Commission on Irrigation and Drainage, 2nd Congress.
28 June–2 July 1954. St. Andrews. Royal Institute of Chemistry Symposium on the Chemistry and Industrial Application of Cellulose.
4–17 Dec. 1954. New Delhi and Dehra Dun. 4th World Forestry Congress.
August 1955. Finland. 9th International Conference of Agricultural Economists.

Canada. Preliminary work (preparing runways etc.) for spraying operations to cover about 250,000 acres of budworm-infested forests in Quebec is under way. The Provincial Government will pay half the cost and the Canadian International Paper Co., Price Brothers, and the Restigouche Co. will share the rest (**1**; Dec. 1953).

The National Research Council has instituted a new Building Research Centre, housed in what is believed to be the first structure in the world designed specifically for building research (**9**; Dec. 1953).

In south-western Ontario 500 acres of Scots Pine infested with the European Pine sawfly were sprayed from the air, another 200 acres were sprayed by hand, and windbreaks and ornamental hedges were treated with dust blowers, using a virus suspension at a rate of one gallon/acre. One pound of skim-milk powder was added to each 20 gallons of spray as a sticker. An examination of 6 plantations showed total mortality of sawfly larvae on the trees except in one plantation incompletely sprayed because of near-by oil derricks (**10**; Oct. 1953).

Germany. The official figure of land suitable for afforestation in the German Federal Republic is 145,000 ha. Of these, 68,000 ha. are heathland or belong to the swampy zone of lower Saxony. The annual rate of afforestation during the past 3 years has been only 4500–5000 ha. The Paul Treckmann Co. of Egelsbach has now developed a planting machine with a planting capacity of 7500/hr. [cf. *For. Abstr.* 15 (No. 1317)] which should help to speed up the process of afforestation (**5**; Aug. 1953).

Great Britain. The Forestry Commission announces the following changes in grants paid to private woodland owners. (1) The planting grant to owners of dedicated woodlands and small woodlands not suitable for dedication will be raised from £14 to £15/acre and the maintenance grant for dedicated woodland from 4*s.* 6*d.* to 5*s.*/acre. (2) A new grant at the rate of half the 'dedication' grant will be paid for planting, after 1 October 1953, to owners who manage their woodlands according to a plan approved by the Forestry Commissioners ('approved woodlands'). (3) A new grant will be paid for the next 5 years for the clearance of unproductive scrub (to be defined in regulations to be issued later), the clearing of which is estimated to cost more than £15/acre, from land which the owner undertakes to restock with trees. The grant will be: (*a*) £7. 10*s.*/acre for areas estimated to cost more than £15 but less than £25/acre to clear, and (*b*) £12. 10*s.*/acre for areas estimated to cost more than £25/acre to clear. The normal planting grant will be payable in addition. The scrub clearance grant will be paid only in respect of dedicated woodlands, small woodlands not suitable for dedication, and 'approved woodlands' (**4**; 5.1.54).

An attempt by the pest department of the Cornwall Agricultural Executive Committee to clear starlings from a 50-acre Bamboo plantation at Lanivet near Bodmin has been abandoned after an objection by the R.S.P.C.A. to the intended use of sulphur fumes (**16**; 3.2.54).

The Indian longhorn beetle (*Trinophylum cribratum*) has been found in Oak and Beech in timber-yards on the Isle of Wight and at Feltham, Middlesex. Several thousand feet of timber have been destroyed. The source of infestation has been traced to timber imported from India at least 10 years ago (**15**; 26.12.54).

A three-bedroomed timber house that can be dismantled and carried on a 5-ton lorry to another site for re-erection will be used as a reception centre by a Mass-Radiography Unit working in London (**15**; 30.1.54).

India. The Forest Research Institute at Dehra Dun has developed a fire- and decay-resistant treatment for thatch, which is said to extend the life of grass thatch from 3 to 15–18 years and of palm-leaf thatch from 2 to 12–15 years (**6**; 19.12.53).

Iraq. Eucalypts, mainly *E. rostrata* and *E. microtheca*, have been widely planted as shade trees and their growth is so good as to suggest that they might well be used extensively for afforestation. One plantation at Abu Ghraib, now ca. 14 years old, has a m.a.i. of ca. 3·6 cu.m./donum (**17**; Dec. 1953).

Korea. The main building of the Central Forest Experiment Station, Seoul, was formally opened at a United Nations Day ceremony in late October (**14**; Dec. 1953).

N. Ireland. The Nuffield Trustees have offered to the Queen's University, Belfast, a sum of £12,000 spread over a period of 4 years, to establish research in the ecology of bogland. The research will be conducted in co-operation with the survey of Ulster boglands now being made under the Northern Ireland Ministry of Commerce. It will be under the general supervision of the Professor of Botany, supported by the professors of geography and geology, the lecturer in archaeology, and other specialists (**16**; 22.12.53).

Norway. A Norwegian Forestry Museum, to show the historical development of forestry, is to be established at the Glomdal Museum (**13**; Jan. 1954).

Sweden. Severe storms early in January have caused damage to forests in central Sweden. Wind-throw amounting to two or more years' ordinary cut has been reported from many places in the area. The large companies badly affected are reducing their normal logging operations and concentrating on salvage of the wind-thrown timber (**15**; 30.1.54).

U.S.A. An improved technique using a new electronic device, an infra-red gas analyser, has been developed at the State University of New York College of Forestry for determining the amount of CO_2 taken from the air by the green plant. The analyser is adapted from a carbon monoxide warning device used in German U-boats during the second World War (**11**; 30.10.53).

In an experiment in Bacon County, Georgia, Pine trees planted on prepared mounds are more than 3 times the size of those on unprepared sites. Survival is 90% as against 50% on the latter. The mound plantings have a system of open drainage (**12**; 15.12.53).

A one-man chain-saw produced in America by the Porter-Cable Machine Company weighs only 18 lb., measures $29\frac{1}{2} \times 6\frac{1}{2} \times 9\frac{1}{4}$ in. and with a 14-in. cutter bar can fell trees up to 28 in. diameter. It has log-gripping teeth that hold the saw against the work. The chain has chrome rust-resistant teeth, runs at 1400 ft./min. and gives a fast clean cut on both hard and soft woods (**15**; 26.12.53).

A Georgia paper reports that attendants at petrol filling stations are regularly emptying motorists' ashtrays as a forest fire prevention measure (**1**; Dec. 1953).

A small ground fire in an Alabama forest was found spreading from a powerline right-of-way, and when it had been controlled it was noticed that sparks and burning embers were falling from a cross-arm on a transmission pole. Closer examination revealed the cause of the fire. A woodpecker had hollowed out a hole near the top of the pole, built a nest and started a brood of young birds. A large chicken snake had climbed the pole, discovered the young birds and proceeded to devour one of them. While, or after, doing so, the snake stretched out on the cross-arm and apparently came into contact with two wires at once. The resulting electric shock killed the snake and produced a spark that set fire to the cross-arm, which was partly rotten and tinder-dry. Burning fragments dropping from the cross-arm had set fire to the litter on the ground (**3**; Jan. 1954).

Bears are reported to be a more serious threat than fire to timber-growing on one Californian company estate. Damage is caused over a period of 75–100 days in the spring and early summer, bark being stripped from Redwood and Douglas Fir. Some 47,000 trees are being killed annually, and 1660 acres of young trees have been destroyed (**7**; Dec. 1953).

A new yeast plant is now under construction at a pulp mill in Green Bay, Wisconsin, where annual production of some 4500 tons/year is planned. Yeast has hitherto been used mainly as a supplementary poultry food, but markets are now developing in the feeding of pigs, dairy calves and cows, fish and hatcheries, dogs and other pets, and fur-bearing animals such as mink (**17**; Dec. 1953).

U.S.S.R. During 1951–2 large-scale experiments in stabilizing shifting sand by spraying it with a bitumen emulsion were made on the desert sands of Karakum and the shifting sands of the Lower Dnieper. Spraying is done immediately after sowing or planting, and the petroleum bitumen used, unlike other bitumens tested, does not injure the plants. Application is made at the rate of 2 tons of emulsion (1 ton of bitumen)/ha. In one experiment on the Lower Dnieper on an area of sand planted with Pine, half the area was bituminized and the other half remained untreated. Two days after planting a severe wind storm occurred, during which the untreated area lost a layer of 30–35 cm. or 3000 tons/ha./day, whereas the treated area showed no effects of wind erosion. Tests made on steep slopes exposed to winds from all directions gave similar results. The effect of treatment on the moisture-absorption of the sand was investigated. When the standard 1 ton of bitumen was used and uniformly distributed, 210 mm. of precipitation/hr. could be absorbed. If the application was increased to 2 tons/ha., the absorptive capacity of the sand markedly decreased. It was found that the rate of evaporation from treated and untreated surfaces was the same at night, in the early morning, and on cloudy days, but on hot or windy days evaporation from untreated was nearly twice as great as that from treated surfaces. The dark colour of the bituminous film also favours the absorption of heat. The sand at a depth of 20 cm., where most of the roots of the young plants are found, is therefore slightly warmer under treated surfaces, but not sufficiently so to harm the growth of the trees. In early spring this higher temperature is a positive advantage. The % survival of plants seems to have been greater on bituminized sands than on sands mechanically protected from blowing by screens, fences etc. Costs were also in favour of bituminization. Tests showed that, using a hand-pump, the treatment required 17·5 man-hours/ha., and with a power pump only 6·6 man-hours/ha. The erection of protective devices, on the other hand, required 130 man-hours/ha. (**17**; Dec. 1953).

The All-Russian Institute of Agricultural Microbiology is reported to have succeeded in obtaining a pure culture of mycorrhizal fungi and developing a method for their mass propagation. The efficacy of the application of the pure culture has been tested at many forest stations in S.E. Russia in Europe, chiefly in Oak plantations. The acorns were sprayed, before sowing, with water containing hyphae of the mycorrhizal fungus. The resulting seedlings showed a greater accumulation of N and other elements in the leaves than did seedlings on control plots not treated at all or treated with the addition of mycorrhizal soil. It is calculated that one grain of the liquid pure culture can serve the purpose of several hundred kilograms of mycorrhizal soil (**17**; Dec. 1953).

It has been established experimentally that an average tree crown of 60 sq. m. surface transpires in every 24 hours the following amounts of water (in kg.): Ash 8, Birch 9, Aspen 9, Beech 5·5, Maple [*Acer platanoides*] 4, Spruce 4, Pine 3, and Fir 3. If the water supply from the roots can be cut off while the

leaves continue to give off water, the moisture content of the wood can be greatly reduced within a short time. This process Russian foresters call 'biological drying'. During 1949–52 tests were made on 4000 cu.m. of sawlogs (mostly of broadleaved species) in Leningrad province, to determine the effect of 'biological felling' on floatability [cf. *For. Abstr.* 13 (No. 2212)]. The felled trees lay on the ground for 8–10 days before being cut up into log lengths; in clear felling this period is long enough to lower the weight of 1 cu.m. by 150–200 kg. With selection felling it takes 30–45 days to obtain these results; and by ordinary air-drying of logs 230 days.

A number of Birch logs 5 m. long and 16–28 cm. in diameter at the smaller end were followed through a whole drive. Biologically dried logs remained in the water for 50 days without sinking; after 3 months, ca. 10% had sunk. When the ends were treated with a waterproof substance, biologically treated logs remained in the water in excellent condition for 5–6 months, sinkings for the whole period ranging from only 0·5 to 3% according to the waterproofing agent used (**17**; Dec. 1953).

W. Africa. The Governments of the 4 British West African Territories have combined to set up a West African Building Research Institute (P.O. Box 1117 Accra, Gold Coast). A start has already been made on an information service (**8**; Jan.-March 1954).